Ehime Maru

Environmental Assessment

15 June 2001

Commander in Chief
U.S. Pacific Fleet
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EHIME MARU ENVIRONMENTAL ASSESSMENT

FINDING OF NO SIGNIFICANT IMPACT

AGENCY: **DEPARTMENT OF DEFENSE**

DEPARTMENT OF THE NAVY

ACTION: Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations Parts 1500-1508) implementing procedural provisions of the National Environmental Policy Act of 1969 as amended (42 United States Code Section 4321 *et seq.*), the Department of the Navy gives notice that an Environmental Assessment has been prepared for the recovery of *Ehime Maru* crewmembers, their personal effects, and certain unique characteristic components of the ship and that an Environmental Impact Statement is not required.

BACKGROUND: On February 9, 2001, USS *Greeneville*, a Los Angeles class submarine, collided with *Ehime Maru*, a Japanese fisheries high school training vessel, approximately 9 nautical miles (17 kilometers) south of Diamond Head on the island of Oahu, Hawaii. *Ehime Maru* sank in approximately 2,000 feet (600 meters) of water. At the time of the sinking, 26 of the 35 crewmembers were rescued. Following an extensive air/sea search, and a sub-sea search and remote-controlled underwater visual inspection of the vessel, it is assumed that some, or all, of the nine missing individuals became trapped inside the vessel or went overboard as the ship went down.

PURPOSE: The purpose of the Proposed Action will be the recovery of the missing crewmembers, personal effects, and certain unique characteristic components from *Ehime Maru*, while limiting the impact on the environment. The Proposed Action will be a hazardous and complex deep- and shallow-water operation, because of the depth of the current location and the size of *Ehime Maru*. The proposed operation has been structured to maximize the probability of recovering crewmembers, personal effects, and items uniquely characteristic of *Ehime Maru*, while minimizing the risk to the divers, the environment, equipment, and other personnel involved. The purpose of the Proposed Action also includes the safe removal, to the maximum extent practicable, of diesel fuel, lubricating oil, loose debris, and any other materials that may degrade the marine environment, and the relocation of *Ehime Maru* to a deep-water site. This is not a salvage operation to recover the ship.

DESCRIPTION OF PROPOSED ACTION: The U.S. Navy proposes to recover *Ehime Maru* crewmembers, personal effects, and certain characteristic components unique to the ship (such as the anchors, forward mast, placard, and ship's wheel) by moving the vessel to a shallow-water area to permit safe diver access and recovery operations. To the extent practicable, the deck of *Ehime Maru* will be cleared of cargo nets, fishing hooks and long lines, rafts, rigging on the masts, and any other obstacles that could cause an impact to the marine environment or jeopardize the success of the recovery operations. The Navy will use a specially-equipped offshore construction vessel to attempt to lift and move *Ehime Maru* from its current location. Flexible lifting plates will be placed under *Ehime Maru* to lift it clear of the seafloor using a sophisticated rigging system attached to heavy wire cables and linear winches mounted on the heavy-lift vessel. If the lift is successful, *Ehime Maru* will then be transported, while suspended from the heavy-lift vessel, to a shallow-water recovery site near the Honolulu International Airport Reef Runway in water approximately 115 feet (35 meters) deep. *Ehime Maru* will then be placed on the seafloor, where containment booms and skimmer systems will have been pre-positioned with the purpose of containing any diesel fuel or lubricating oil that may be released. The heavy-lift vessel will detach from *Ehime Maru* and will be replaced by a diving support barge. When *Ehime Maru* is deemed stable, Navy divers and invited Japanese divers from Ship Repair Facility, Yokosuka, Japan will enter the hull and attempt recovery of crewmembers, any personal effects, and other uniquely characteristic components. They will also attempt to remove remaining diesel fuel and lubricating oil to the maximum extent practicable. *Ehime Maru* will then be lifted from the seafloor and relocated to a deep-water site at a depth of at least 1,000 fathoms (6,000 feet [1,800 meters]) and outside U.S. territorial waters.

Although this recovery operation has been deemed technically feasible, the proposed engineering solutions are untested in this type of operation. Engineers and salvage experts have based their feasibility assessment upon estimates and calculations on the size of the hole in *Ehime Maru* and their considered opinion on the anticipated structural integrity of *Ehime Maru*. However, since they have done these calculations and estimates without having seen the damage to *Ehime Maru* because the vessel sits upright in 2,000 feet (600 meters) of water, there is some uncertainty as to the exact level of damage. Unplanned occurrences such as structural failure could preclude continuation of the mission at any point during the operation. Such occurrences will cause the Navy to reevaluate whether recovery operations should be continued or terminated, based on the existing situation at the given time and the probability of successfully completing the proposed recovery operations. The Navy will attempt to recover as many crewmembers, personal effects, and other objects as possible.

ALTERNATIVES CONSIDERED: Three alternative methods of recovering the crewmembers were considered but determined not to be technically feasible or safe. Thus, they were not studied in detail for analysis in the Environmental Assessment. These alternatives included deep-water recovery at the present site, recovery while the vessel was lifted and suspended from the offshore recovery vessel, and recovery out of water. Four additional shallow-water recovery sites were also considered but were not analyzed fully because of their inability to meet mission requirements and because of safety and environmental concerns. Per the requirements of the National Environmental Policy Act, a Recovery-not-possible Alternative, or the "No Action Alternative" was also considered that would leave *Ehime Maru* in its current location and condition.

ENVIRONMENTAL EFFECTS: Consistent with the Council on Environmental Quality regulations, the scope of the analysis presented in the Environmental Assessment was defined by the range of potential environmental impacts that could result from implementation of the Proposed Action or the Recovery-not-possible Alternative. The criterion for inclusion or exclusion of particular environmental components and their attributes was whether the Proposed Action or the Recovery-not-possible Alternative could potentially impact, directly or indirectly, that environmental component and its attributes. The Environmental Assessment evaluated the following resource areas in detail: water quality; marine biological resources, including coral reefs; health and safety; hazardous materials and hazardous wastes; and airspace use. Ocean areas outside U.S. territorial waters were addressed as required by Executive Order 12114.

In terms of air quality, while there will be mobile emissions from the ships, barges, spotter planes, and helicopters involved in the operation, there will be no stationary source emissions. Furthermore, there will be no hazardous or toxic air pollutants from stationary emissions not covered by the National Ambient Air Quality Standards or the National Emission Standards for hazardous air pollutants. Terrestrial biological resources will not be affected since all activities will be confined to either deep-water or shallow-water areas off the coast of Oahu. There are no areas of concern for cultural and archaeological resources, historic buildings and structures, or traditional cultural properties. There are no areas of ethnic importance that could be affected.

Similarly, there will be no adverse impacts to land, geology (local physiography, topography, geological resources), or soils. There will be no impacts to land use, or any conflicts with land use plans, policies, or controls. There may be some noise associated with the operations, but any noise will be short-term, intermittent, and no different from regular ongoing vessel and aircraft noise in the area. With such a short time frame for implementing the Proposed Action, the potential for adverse socioeconomic impacts to income, population, housing, community services, and infrastructure will not exist. No transportation-related impacts to road, rail, air, or water modes are expected, and the Proposed Action will have no effect on local utilities in terms of their energy, potable water, wastewater or solid waste processing and distribution capacities, storage capacities, average daily consumption, or peak demand loads. Lastly, no permanent change to the existing character of the landscape or scenic viewshed will occur, and thus there will be no impacts to visual and aesthetic resources.

Due to the limited scope and nature of the recovery operation, only water quality, marine biological resources, public health and safety, and airspace are likely to be affected by recovery activities. The greatest potential for effects to water quality, marine biology, and health and safety is from hazardous materials such as diesel fuel or lubricating oil escaping from *Ehime Maru* during lifting, transit, or shallow-water recovery operations. These potential environmental effects are summarized below for the Proposed Action and the Recovery-not-possible Alternative.

Water Quality: The Proposed Action is not expected to measurably alter biologically important parameters of water quality including salinity, temperature, pH, density, and dissolved gases except in the immediate area of a potential diesel fuel or lubricating oil release. Potential effects to physical and chemical water quality are judged to be minimal because they will be localized and transitory and subject to planned response actions and weathering. Additionally, if the Proposed Action is successful, by removing as much diesel fuel and lubricating oil as practicable from the ship, there will be a long-term beneficial effect on marine water quality.

Marine Biological Resources: The Proposed Action is not expected to adversely impact the Essential Fish Habitat for pelagic management unit species or any other designated Essential Fish Habitat. The greatest potential for impacts will come with the lifting of *Ehime Maru* from the seafloor and as it is relocated from the current location to the shallow-water recovery site. Any release of this type is expected to rise to the surface, spread out, and rapidly evaporate. In addition, boom systems and skimmer vessels will already be deployed in accordance with the Proposed Action with the intent of containing the potential release of diesel fuel and lubricating oil. The execution of the Proposed Action, including measures incorporated to address anticipated releases of diesel fuel and lubricating oil, will minimize the potential for impacts to marine fish and Essential Fish Habitat.

For the recovery operations, the Navy will also take every precaution to minimize impacts to marine biological resources. These steps include notifying the appropriate resource agencies to attempt to administer necessary assistance if birds, marine mammals, or sea turtles should come in contact with a diesel fuel or lubricating oil release. The U.S. Fish and Wildlife Service will conduct pre-recovery and post-recovery surveys of three areas on Oahu and one on the island of Kauai to identify any oiled birds. In addition, U.S. Fish and Wildlife Service and/or National Marine Fisheries Service observers will be stationed on the skimmer vessel to identify any birds, mammals, or sea turtles that may come in contact with the diesel fuel or lubricating oil from a release.

In accordance with the Proposed Action, if it is possible, oiled birds will be stabilized and delivered to a rehabilitation facility. Notifications will be made to the National Marine Fisheries Service should mammals or sea turtles be oiled. The International Bird Rescue Research Center will be contracted for technical assistance with rescue and rehabilitation of oiled birds. Overall potential impacts to migratory seabirds are unlikely. The threatened green sea turtle may be in the area of the current location only as a transient from one island to another. The endangered hawksbill turtle may also be in Hawaiian waters in very low numbers. Because of the low probability for either of these species to be in the area of the current location at any particular time, the activities of lifting *Ehime Maru* at the current location are expected to have no effect on the green sea turtle or the hawksbill sea turtle. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service concur with this assessment.

Health and Safety: The potential impacts to both public and worker health and safety associated with underwater recovery operations will occur on the sea and on the shore. Any release of diesel fuel or lubricating oil will be quickly responded to, thus minimizing risk to public health and safety. Both the U.S. Navy and the contractors associated with the recovery of *Ehime Maru* have safety policies and procedures relating to the performance of all activities within the scope of their operations. Inclement weather conditions could also pose a potential safety hazard. The Navy's Recovery Officer will determine if the weather conditions are potentially hazardous and will utilize available information, past experience, and the operational limits of the heavy-lift vessel to minimize safety risks as a result of inclement weather.

The recovery operation may generate interest from the public. To ensure the protection of all persons and property, a surface safety zone with a radius of 3 nautical miles (approximately 6 kilometers) will be established for operations at the current location and the deep-water relocation site. For the transit areas and the shallow-water recovery site, the surface safety zone will have a radius of 1 nautical mile (approximately 2 kilometers) centered on the operations. Therefore, there will be minimal risk to the public during the activities. To ensure diver safety, all diving operations will be conducted in accordance with *The U.S. Navy Diving Manual*. Voice communication integrity for the diving recovery operations will be maintained by requesting Honolulu Control Facility minimize air traffic in an area at and below 2,000 feet (approximately 600 meters) with a radius the same as that of the surface safety zone. The vessel will be moved only during daylight hours and during favorable weather conditions to ensure the safety of operation personnel, to minimize the potential for mishaps, and to ensure detection of any "sheen" resulting from the release of diesel fuel or lubricating oil.

A Site Safety and Health Plan has been prepared for all personnel associated with the cleanup of any release of diesel fuel or lubricating oil. The Site Safety and Health Plan focuses on the protection of personnel from serious risks to their physical safety and health while responding to a marine discharge. This plan identifies the potential hazard conditions and outlines the specific safety and health training together with the job skills and procedures appropriate to the responder's role in the response operations. Appropriate personnel involved in the cleanup operation will receive training to ensure their awareness of the Site Safety and Health Plan.

Airspace: As part of the Proposed Action, the Federal Aviation Administration will impose a temporary flight restriction in the airspace above the recovery effort operations at the current location, the transit routes, and the deep-water relocation site within U.S. territory. Further, the Federal Aviation Administration may impose a temporary flight restriction in the airspace above the shallow-water recovery site. The temporary flight restrictions, in accordance with federal aviation regulations, will prevent an unsafe congestion of sightseeing aircraft above the operations. It will also ensure that aircraft will not interfere with communications during the operations. A Notice to Airmen will be issued to alert pilots of the temporary flight restrictions. Establishing the temporary flight restrictions and releasing the Notice to Airmen will effectively control the airspace above the operations. It will temporarily change the nature of the airspace above the Proposed Action locations but will not adversely impact navigable airspace and operations at Honolulu International Airport. Similarly, the U.S. Coast Guard will enforce surface safety zones as published in the *Federal Register* and in Notices to Mariners.

Hazardous Materials and Hazardous Waste: As a result of the Proposed Action, the potential impacts from hazardous materials released could occur during transit and recovery operations. These impacts will be associated with any release of diesel fuel or lubricating oil from *Ehime Maru*; however, the resulting "sheen" could be readily detected since transient recovery would only occur during daylight hours. Such a release could affect water quality, biological resources, and land areas used for a variety of public and private activities. The recovery plan anticipates some release of diesel fuel and lubricating oil and provides measures for control of these anticipated releases. These measures include the use of skimmers, absorbent booms, and aircraft spotters. Incident Action Plans have also been prepared and approved to address unanticipated releases. Additionally, a Unified Command with representatives from the State of Hawaii, the U.S. Coast Guard, and the Navy will be established consistent with the Incident Command System during the lift and movement phase of the operation in order to monitor the execution of the recovery plan and to assist the Navy in the case of an unanticipated release. Overall, given the procedures and equipment that will be in place to respond to a release, only minor impacts are expected.

To assist the Navy in forecasting favorable wind and current conditions, the Navy's plan is to monitor real-time surface and subsurface currents by data buoys. Buoys will be placed at the edge of the coral fringe, 2 to 3 nautical miles (approximately 4 to 6 kilometers) from the shallow-water recovery site, and at the shallow-water recovery site. The buoys will monitor wind speed and direction, air temperature, surface or subsurface current speed and direction in the water column, and wave height and period. These buoys will be in place approximately 30 days before the start of recovery operations. Data from the buoys will help ensure that operations will take place only during weather conditions most favorable for containing a release.

Modeling conducted by the National Oceanic and Atmospheric Administration determined optimal sea-state and wind conditions for transit. These models assumed an average wind speed of 10 knots (approximately 20 kilometers per hour) for the shallow-water recovery site during ebb and flood tide. The models did not consider the extensive preventative measures such as booming; they only modeled the likely place that diesel fuel would travel should no intervention occur. Overall, these models showed that winds from the east would very likely push some diesel fuel toward the beach during both tidal conditions over a 24-hour period with no intervention. Again with no intervention, winds from the east/northeast could also potentially push diesel fuel toward the beach during either tidal condition over a 24-hour period. Winds from the north or northeast would push the diesel fuel out to sea.

Infrequently, light trade wind conditions in the morning can cause a local onshore wind, or seabreeze, in the afternoon. During an uncontained diesel fuel or lubricating oil release, such a seabreeze could potentially result in the substance washing onshore.

Therefore, during the transit to the shallow-water recovery site, the heavy-lift vessel will remain approximately 3 nautical miles (approximately 6 kilometers) from the shallow-water recovery site and wait for optimal sea and weather conditions before proceeding. This, coupled with the extensive preventative measures that the Navy will employ, will minimize the potential for any releases to be pushed toward the shore. The potential for transit during easterly winds exists. However, this will only occur when other sea conditions (tide, current, sea state) are predicted to be as favorable as possible. Skimmer systems and containment booms will be in place if decisions must be made to transit with easterly winds, thus minimizing potential impacts to the environment.

Because there is the potential that not all the diesel fuel and lubricating oil can be removed during the recovery effort, skimmer vessels will be on standby and periodic aircraft overflights will be made to identify any surface sheens. Discovery of such releases is enhanced by operations occurring only during daylight hours, so the Navy will only move the ship during daylight hours. During transit to the deep-water relocation site, the nearby South Oahu Ocean Dredged Material Disposal Site will be avoided. Because of the procedures and equipment that will be in place, no adverse impacts are expected.

Recovery-not-possible Alternative: If the Recovery-not-possible Alternative is chosen, *Ehime Maru* will remain at its current location and in its present condition. This alternative will not allow for the recovery of crewmembers, their personal effects, and certain characteristic components unique to *Ehime Maru*, such as the anchors, forward mast, placard, and ship's wheel. There will be no removal of diesel fuel and lubricating oil. The deck will not be cleared of cargo nets, fishing hooks and long lines, rafts, rigging on the masts, and any other obstacles that could cause a future impact to the marine environment.

However, this alternative will eliminate the potential for a release of diesel fuel or lubricating oil close to shore because the ship will not be moved. No impacts to marine resources including Essential Fish Habitat, migratory birds, marine mammals, or threatened or endangered species are expected from this alternative. Under this alternative, because of the current location at 2,000 feet (600 meters), there will be no increased risk to public health and safety. Under this alternative, no temporary flight restrictions will be required. Consequently, there will be no impacts to controlled/uncontrolled airspace, enroute low altitude airways, or airports or airfields in the general airspace use region. This alternative will not allow for the recovery of potentially remaining hazardous materials that could affect the environment.

CONCLUSION: Based on the information gathered during preparation of the Environmental Assessment, the Department of the Navy finds that the Proposed Action will not result in significant environmental impacts. Therefore, an Environmental Impact Statement is not required.

To request a copy of the Environmental Assessment, please call toll free 866-617-0797 and leave a message with your name and mailing address. A limited number of copies of the Environmental Assessment are available to fill single-copy requests. The Environmental Assessment may be viewed on the internet (www.cpf.navy.mil), at public libraries in the City of Honolulu, and at the University of Hawaii library.

Dated: June 15, 2001

THOMAS B. FARGO
Admiral, USN
Commander in Chief, U.S. Pacific Fleet

EXECUTIVE SUMMARY

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INTRODUCTION

This Environmental Assessment is being prepared to evaluate the potential environmental effects of the U.S. Navy's proposal to lift the Japanese ship *Ehime Maru* from the seafloor, transport the vessel to a shallow-water site in order to recover the crewmembers, and then permanently relocate the ship to a deep-water site. Preparation of the Environmental Assessment implements U.S. law and policy, contained in the National Environmental Policy Act and its implementing regulations, to consider the potential environmental effects of federal actions as part of the agency's decision processes. The analysis in the Environmental Assessment will assist Navy officials in making informed decisions concerning recovery of *Ehime Maru* crewmembers, their personal effects, and certain unique characteristic components of the ship (such as the anchors, forward mast, placard, and ship's wheel), while minimizing the risk to divers, the environment, equipment, and other personnel involved. The Proposed Action would also include the safe removal, to the maximum extent practicable, of diesel fuel, lubricating oil, loose debris, and any other materials that may degrade the marine environment, and the relocation of *Ehime Maru* to a deep-water site. This is not a salvage operation to recover the ship.

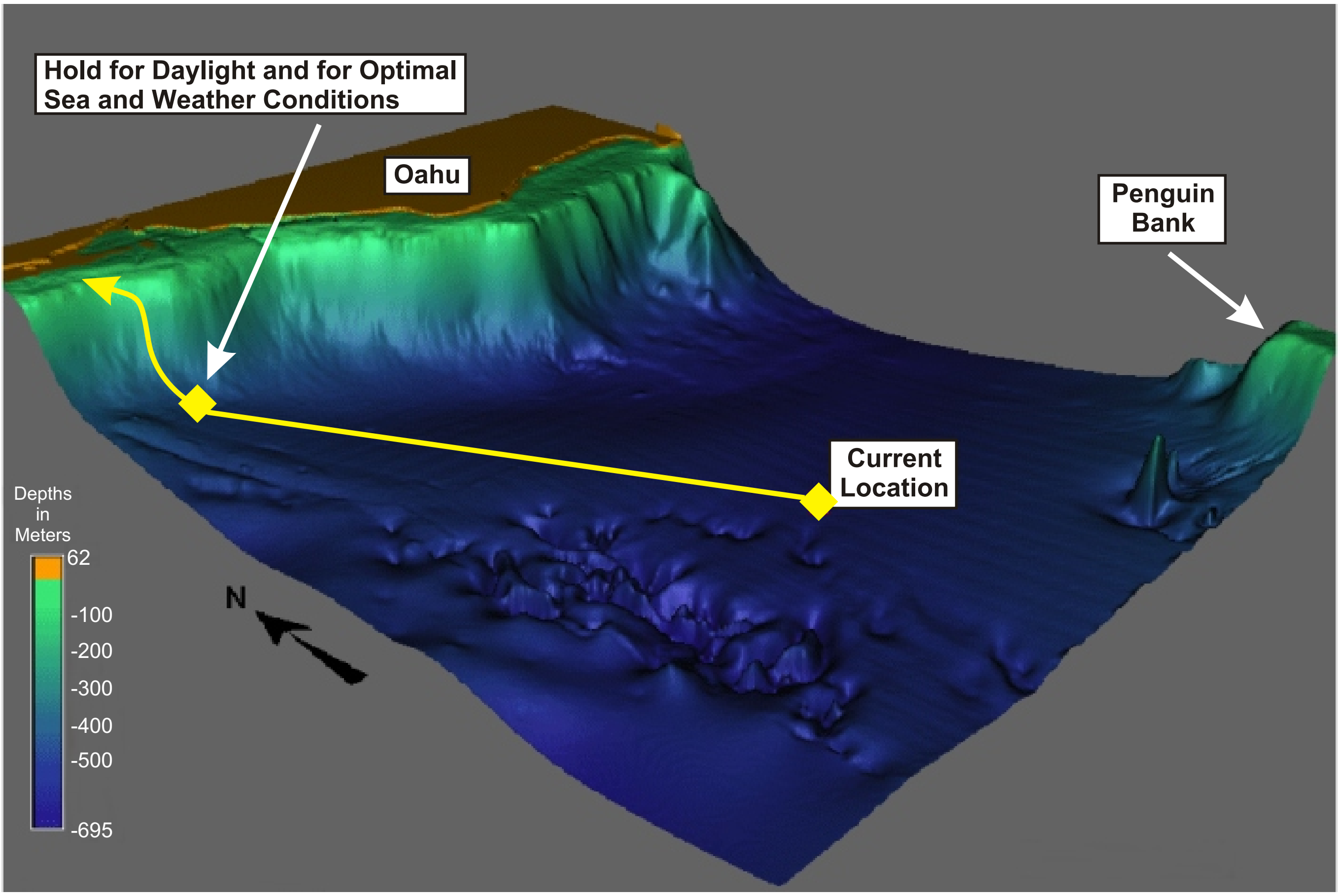
BACKGROUND

On February 9, 2001, USS *Greeneville*, a Los Angeles class submarine, collided with *Ehime Maru*, a Japanese training and fishing vessel, approximately 9 nautical miles (17 kilometers) south of Diamond Head on the island of Oahu, Hawaii (figure ES-1). *Ehime Maru* sank in approximately 2,000 feet (600 meters) of water. At the time of the sinking, 26 of the 35 crewmembers were rescued. However, despite an extensive air and sea search for the nine remaining crewmembers, the Navy was unable to locate them, and it is presumed that they were trapped inside the vessel or went overboard as the ship went down. The vessel is resting upright on the seafloor at 21 degrees 04.8 minutes North latitude, 157 degrees 49.5 minutes West longitude, outside of state of Hawaii waters. The Navy and the Commanding Officer, USS *Greeneville*, have accepted full responsibility for the collision and its result.

Following communication with the Government of Japan to determine the desires of the families of the missing crewmembers, the Navy has agreed and is determined to make all reasonable efforts for the recovery of *Ehime Maru* crewmembers, their personal effects, and certain unique characteristic components of the ship.

EVALUATION OF ALTERNATIVE RECOVERY METHODS

The Navy assembled a diverse and knowledgeable team of experts to evaluate the feasibility and effects of alternative methods of conducting recovery operations. Using Remotely Operated Vehicles with video cameras, the Navy was able to determine that *Ehime Maru* had suffered obvious external hull damage. Although the bottom of the hull is



Source: U.S. Department of the Navy, 2001b

Current Location of *Ehime Maru*

Not to Scale

Figure ES-1

1_1CurrentLocation053101

not visible, it is expected that the vessel has a large hole in the bottom of the hull near its stern, caused by the rudder of the Navy submarine. This was the likely cause of the rapid sinking of the vessel. It is also assumed that the force of the collision opened the vessel's bulkheads and that fuel tanks and other closed containers were crushed by the enormous change in pressure caused by the rapid sinking of the vessel to its present 2,000-foot (600-meter) depth. Consequently, it is possible that a substantial quantity of diesel fuel and lubricating oil has leaked out of the storage tanks and has collected in pockets within the vessel's hull.

Due to the extensive structural damage to *Ehime Maru*, the Navy determined that a number of potential recovery methods were not feasible. The use of Remotely Operated Vehicles is not feasible because they do not have the capability to cut through obstructions or to enter closed compartments to make a thorough search for the crewmembers. Similarly, available saturation diver systems are not capable of conducting recovery operations at the 2,000-foot (600-meter) depth.

Unprotected divers cannot work at a 2,000-foot (600-meter) depth. Consequently, the Navy considered lifting *Ehime Maru* from the seafloor and suspending it within 100 feet (30 meters) of the heavy-lift vessel and using divers to recover crewmembers and personal effects while *Ehime Maru* was suspended in the open ocean. However, the Navy rejected this alternative because its experts concluded that there was an unacceptable risk to the lives of divers involved in the recovery effort.

The Navy also considered a number of alternative ways of removing *Ehime Maru* from the water to conduct recovery activities. However, none of these alternatives were considered feasible due to the structural damage to the vessel's hull and the unavailability of an effective method to transport or transfer the vessel to an out-of-water site for recovery operations. Furthermore, the risks to Hawaii's pristine environment were considered too great to attempt to transfer *Ehime Maru* out of the water.

PROPOSED ACTION AND ALTERNATIVES

The Navy proposes to lift *Ehime Maru* approximately 100 feet (30 meters) off the seafloor with specially designed equipment and lifting mechanisms. While suspended in the water approximately 100 feet (30 meters) above the seafloor, the vessel would be transported to a shallow-water recovery area only during daylight hours. Once stabilized at a shallow-water recovery area, a team of American and invited Japanese divers would conduct a thorough search of all safely accessible areas of the vessel in order to find and recover the crewmembers and personal effects. While searching, the divers would videotape all of their activities. The Navy would then attempt to remove diesel fuel and lubricating oil and other materials that could adversely affect the marine environment. After inviting Japanese divers to conduct a final search of the ship, the Navy would secure compartments and openings in the vessel to prevent loose material from escaping and would transport *Ehime Maru* to a deep-water relocation site.

The Navy, with the assistance of state and federal agencies, conducted extensive surveys and analyses of potential shallow-water recovery sites to determine which sites warranted further consideration and analysis in this Environmental Assessment. Five sites were initially identified as potential shallow-water recovery sites. They included a site adjacent to the Honolulu International Airport Reef Runway, a site off Ewa Beach west of the entrance to Pearl Harbor, a site on the Waianae Coast north of Barbers Point Harbor, and two sites off of Molokai, one just east-southeast of Laau Point and the other on the western edge of Penguin Bank.

The Navy determined that the Penguin Bank site would present an unacceptable risk to divers during recovery operations due to hazardous sea-state conditions. Both Molokai sites are also located within the Hawaiian Islands Humpback Whale National Marine Sanctuary. Consequently, these sites were not given further consideration and are not evaluated for environmental effects in this Environmental Assessment.

Following a further evaluation of the remaining three sites, including safety, security, environmental and logistical considerations, the Navy identified the Reef Runway site as its preferred site for conducting shallow-water recovery operations.

The site that the Navy is considering for deep-water relocation of *Ehime Maru* is southwest of the Reef Runway shallow-water recovery site just beyond the 1,000-fathom (6,000-foot, 1,800-meter) contour and outside U.S. territorial waters.

Although this recovery operation has been deemed technically feasible, the proposed engineering solutions are untested in this type of operation. Engineers and salvage experts have based their feasibility assessment upon estimates and calculations on the size of the hole in *Ehime Maru* and their considered opinion on the anticipated structural integrity of *Ehime Maru*. However, since they have done these calculations and estimates without having seen the damage to *Ehime Maru* (the vessel sits upright in 2,000 feet [600 meters] of water), there is some uncertainty as to the exact level of damage.

Although there are risks and potential structural damage that could prevent the Navy from successfully achieving its goal, the Navy is confident that it could lift and move *Ehime Maru* to a shallow-water site for recovery of the crewmembers and would make every reasonable effort to do so. At various critical points in the Proposed Action, structural failure could preclude continuation of the mission. Unplanned occurrences such as this would cause the Navy to reevaluate whether recovery operations should continue or be terminated based on feasibility and probability of crewmember recovery. Depending upon where a failure might occur and if the Proposed Action were stopped, the Navy would attempt to recover as many crewmembers, personal effects, and other objects as possible. To the maximum extent practicable, these objects would include the cargo nets, fishing hooks and long lines, rafts, rigging on the masts, and any other obstacles that could cause a future impact to the marine environment. Extreme structural damage, if present, would prevent the vessel being moved intact and thus would prevent the Navy from conducting the planned recovery operations. This recovery operation is not without risks, and there is no guarantee of success.

Because of the nature and uniqueness of the Proposed Action, engineering methods continue to mature. As specific changes are developed they would be evaluated within the context of the Proposed Action. If the changes introduce a potential for environmental effects that are substantially different, then additional environmental documentation would be prepared.

In accordance with the requirements of National Environmental Policy Act, a Recovery-not-possible Alternative was also considered that would leave *Ehime Maru* in its current location and present condition.

POTENTIAL ENVIRONMENTAL EFFECTS

Due to the limited scope and nature of the recovery operation, only water quality, marine biological resources, public health and safety, and airspace are likely to be affected by recovery activities. The greatest potential for effects to water quality, marine biology, and health and safety would result from hazardous materials, such as diesel fuel or lubricating oil escaping from *Ehime Maru* during lifting, transit, or shallow-water recovery operations. These potential environmental effects are summarized below.

Current Location

At the time of the collision with the Navy submarine, *Ehime Maru* carried approximately 65,000 gallons (246,000 liters) of diesel fuel, 1,200 gallons (4,500 liters) of lubricating oil, and 46 gallons (182 liters) of kerosene, as well as smaller quantities of other materials, such as paints, solvents, and chemicals. No polychlorinated biphenyls (PCBs) or asbestos were aboard or used in the ship's construction or equipment. Based on aerial observations for 3 days following the collision, the Navy has conservatively estimated that the volume potentially remaining, and thus the maximum credible release, would be approximately 45,000 gallons (170,000 liters).

There is no evident long-term adverse effect on the marine environment from the previously released petroleum products. Any release of diesel fuel or lubricating oil during efforts to lift *Ehime Maru* would occur deep in the ocean and would likely disperse in the water column with little, if any, visible effect at the surface. However, the Navy would have pollution response vessels and materials available to control these releases, should they surface. There would be some disturbance to the area in the immediate vicinity of the vessel during activities to place lifting plates under its hull and to lift it off the bottom. However, any effects on marine organisms would be limited and short term.

A surface safety zone with a radius of 3 nautical miles (approximately 6 kilometers) around the heavy-lift vessel and a temporary flight restriction area in airspace up to an altitude of 2,000 feet (approximately 600 meters) would be established to prevent interference with recovery operations. Normal flight activities would not be affected.

Transit to Shallow-water Recovery Site

There are some characteristics of the ocean bottom (gradient and relief) along the transit route from the current location of *Ehime Maru* to the shallow-water recovery site that could potentially interfere with the towing clearance. The major concern during transit would be the potential release of contaminants (mainly diesel fuel and lubricating oil) from the vessel into the marine environment. This could temporarily contaminate marine waters and adversely affect marine mammals, migratory birds, and other protected species, such as sea turtles. However, the Navy would minimize the likelihood of harm to any of these protected species by including preventive measures as an integral part of the Proposed Action to contain any release of hazardous materials while in transit. These preventative measures are as follows:

Recovery Plan (Anticipated Releases):

- Incorporating environmental considerations into final site selection within the shallow-water recovery area
- Pre- and post-inventories of bird habitat
- Real-time spot weather forecasts
- Removing cargo nets, long line fishing gear, and other equipment that might be lost during transport, prior to initial lift of the vessel
- Availability and use of skimmers and booms
- Oil-plume modeling of wind direction, speed, and sea states necessary to avoid oil on beach
- Provide real-time surface and water-column currents
- Timing the final move to the shallow-water recovery site with favorable wind, current, and tides
- Placing U.S. Fish and Wildlife Service and/or National Marine Fisheries Service personnel on skimmers to respond to oiled bird incidents
- Standing up oiled bird stabilization facilities at Kaneohe or Pearl Harbor

Unanticipated Releases:

- Pre-developed Incident Action Plan
- Standing up Unified Command

Specifically, the Navy would deploy skimmer systems and containment booms during transit and recovery operations to ensure an immediate response capability in the event of a release. The vessel would be moved only during daylight hours and during favorable weather conditions to ensure the safety of operation personnel, to minimize the potential for mishaps, and to ensure detection of any “sheen” resulting from the release of diesel fuel or lubricating oil. A surface safety zone with a radius of 1 nautical mile (approximately 2 kilometers) centered on the recovery vessel during recovery operations would be established to protect the public and prevent interference with recovery operations. The Federal Aviation Administration may impose a temporary flight restriction in the airspace above the shallow-water recovery site. Normal flight activities would not be affected.

Modeling conducted by the National Oceanic and Atmospheric Administration determined optimal sea state and wind conditions for transit. These models assumed an average wind speed of 10 knots (approximately 20 kilometers per hour) for the shallow-water recovery site and were run for ebb and flood tidal conditions. This modeling also provided the Navy with an acceptable methodology from which to predict the extent and locations that releases of diesel fuel would travel. Overall, these models showed that winds from the east would very likely push diesel fuel onto the beach during both tidal conditions over a 24-hour period with no intervention. Likewise, with no intervention, winds from the east/northeast could also potentially push diesel fuel onto the beach during either tidal condition over a 24-hour period. Winds from the north or northeast would push the diesel fuel out to sea.

Infrequently, light trade wind conditions in the morning can cause a local onshore wind, or seabreeze, in the afternoon. During an uncontained diesel fuel or lubricating oil release, such a seabreeze could potentially result in the substance washing on shore.

Therefore, during the transit to the shallow-water recovery site, the heavy-lift vessel would remain approximately 3 nautical miles (approximately 6 kilometers) from the shallow-water recovery site and wait for optimal sea and weather conditions before proceeding. This, coupled with the extensive preventative measures that the Navy would employ, would minimize the potential for any releases being pushed toward the shore. The potential for transit during easterly winds exists. However, this would only occur when other sea conditions (tide, current, sea state) are predicted to be as favorable as possible. Skimmer systems and containment booms would already be in place or on standby if decisions must be made to transit with easterly winds, thus minimizing potential impacts to the environment.

Shallow-water Recovery

The Reef Runway shallow-water recovery site is close to sensitive shore and beach areas and in relatively shallow water (approximately 115 feet [35 meters] deep). Consequently, any significant release of diesel fuel or lubricating oil would have greater potential impacts than in deeper water, either at the current location or during transit. However, the Navy has developed extensive plans and procedures, in coordination with state and federal emergency planning agencies, to minimize the potential for environmental impacts at these sites.

The Navy would have on-scene containment booms, skimmer systems, and dispersants available to contain and clean up any releases during recovery operations. Every effort would be made to prevent any releases from reaching beach or shore areas. An Incident Action Plan has also been prepared and approved to address unanticipated releases. Additionally, a Unified Command with representatives from the State of Hawaii, the U.S. Coast Guard, and the Navy would be established, consistent with the Incident Command System, during the lift and relocation phase of the operation in order to monitor the execution of the recovery plan and to assist the Navy in the case of unanticipated release.

The U.S. Fish and Wildlife Service would conduct pre-recovery and post-recovery surveys of three areas on Oahu and one on the island of Kauai to identify any oiled birds. In addition, U.S. Fish and Wildlife Service and/or National Marine Fisheries Service observers would be stationed on the skimmer vessel to identify any birds, mammals, or sea turtles that may come in contact with a release. If it is possible, oiled birds would be stabilized and delivered to a rehabilitation facility. The International Bird Rescue Research Center would be contacted for technical assistance with rescue and rehabilitation of oiled birds. Overall, potential impacts to migratory seabirds are unlikely.

Disturbance of marine organisms at the shallow-water recovery site could result from placement and stabilization of *Ehime Maru*, anchoring of support vessels, and operation of support and recovery equipment. However, these effects would be minimized by careful placement of the hull and mooring system to avoid live coral and sensitive fish and the threatened green sea turtle habitat. The Reef Runway recovery site is a disturbed habitat and, consequently, green sea turtles are not common at that location. Extensive underwater surveys have been conducted at the shallow-water site to assist Navy and natural resource agencies in identifying specific areas within the site where recovery operations may be conducted with the least impact to live coral, green sea turtles, and other marine organisms on the seafloor.

Recovery operations may generate interest from the public. Consequently, measures would be instituted to protect both the public and recovery personnel. It is critical both to their safety and effectiveness that the diving team be able to act and communicate without physical or noise interference from the public. Consequently, the Navy would establish a surface safety zone with a radius of 1 nautical mile (approximately 2 kilometers) around the recovery operations to ensure diver safety. Communications integrity for the recovery operations would be maintained by establishing a temporary flight restriction area at and below an altitude of 2,000 feet (approximately 600 meters) within a radius of 1 nautical mile (approximately 2 kilometers). The Reef Runway recovery site is within the Naval Defense Sea Area controlled by the Navy and is under the active control of the Honolulu Control Facility. In addition, a temporary flight restriction area in the airspace around the site and the release of a Notice to Airmen would be implemented to preclude aircraft intrusion into the area. Recovery operations at the Reef Runway recovery site would not affect scheduled airline flight routes or activities.

Recovery of *Ehime Maru* crewmembers, their personal effects, and certain unique characteristic components of the ship is the Navy’s primary goal. Once this is accomplished, a secondary objective would be to attempt to remove to the maximum extent practicable any remaining diesel fuel, lubricating oil, or other materials that could be hazardous to the marine environment. However, diver safety would be of paramount importance, both in efforts to recover the crewmembers and, subsequently, to remove hazardous materials from the vessel. A Diving Medical Officer and technicians and standby divers would be available on the diving support vessel during all diving activities, which would occur only during daylight hours. Decompression chambers would also be present on the support vessel. In addition, the Fleet Recompression Chamber at Pearl Harbor and local hospitals could be reached within a matter of minutes from the Reef Runway recovery site in the event of an emergency.

Relocation to Deep-water Site

Following recovery of *Ehime Maru* crewmembers, their personal effects, certain unique characteristic components, and the removal to the maximum extent practicable of the diesel fuel, lubricating oil, and other known hazardous materials, Japanese divers would be invited to do a final inspection of *Ehime Maru*. Afterwards, Navy divers would secure doors by any means available to prevent loose material from falling off the vessel during relocation to the deep-water site. The vessel would then be lifted clear of the seafloor by the diving support barge and relocated to the deep-water site, following a previously surveyed route to avoid obstructions and sensitive areas. Navy skimmers and other response equipment would remain available during this phase of the operation to ensure releases of any residual diesel fuel or lubricating oil from the vessel would not adversely affect the marine environment. Upon arrival at the deep-water relocation site outside U.S. territorial waters, *Ehime Maru* would be released and allowed to sink to the bottom of the sea in over 1,000 fathoms (6,000 feet or 1,800 meters) of water. The vessel would be equipped with a pinger that would assist in identifying *Ehime Maru's* final location coordinates accurately on the seafloor. The signal from the pinger would be similar to the type used on airplanes and would be localized. Therefore, the pinger would not be expected to adversely affect individual animals and would stop functioning after about 30 days. Relocation to the deep-water site is not expected to result in any noticeable reduction in water quality or have any long-term effect on marine resources or biota.

Recovery-not-possible Alternative

Under this alternative, *Ehime Maru* would not be recovered and would remain at its current location in its present condition. This alternative would not allow for the recovery of potentially remaining hazardous materials that could affect water quality. The deck would not be cleared of cargo nets, fishing hooks and long lines, rafts, rigging on the masts, and any other obstacles that could cause a future impact to the marine environment. However, this alternative would eliminate the potential for a release close to shore because the ship would not be moved. No impacts to marine resources including Essential Fish Habitat, migratory birds, marine mammals, or threatened or endangered species are expected from this alternative. Under this alternative, because of the current location at 2,000 feet (600 meters), there would be no increased risk to public health and safety. This alternative would not allow for the recovery of potentially remaining hazardous materials that could affect the environment. Under this alternative, no temporary flight restriction would be required. Consequently, there would be no impacts to controlled/uncontrolled airspace, enroute low altitude airways, or airports or airfields in the general airspace use region.

CONCLUSION

Based on the information gathered during preparation of the Environmental Assessment, the Proposed Action would not result in significant impacts to the environment, as shown in table ES-1.

Table ES-1: Comparison of Actions and Alternatives

RESOURCE CATEGORY	PROPOSED ACTION: Current Location	PROPOSED ACTION: Transit to the Shallow Water Recovery Site	PROPOSED ACTION: Shallow Water Recovery Site	PROPOSED ACTION: Transit to the Deep Water Recovery Site	PROPOSED ACTION: Deep Water Relocation Site	RECOVERY NOT POSSIBLE ALTERNATIVE
Water Quality	Appropriate procedures and equipment would be in place to minimize potential impacts to water quality from a diesel fuel or lubricating oil release.	Appropriate procedures and equipment would be in place to minimize potential impacts to water quality from a diesel fuel or lubricating oil release.	Appropriate procedures and equipment would be in place to minimize potential impacts to water quality from a diesel fuel or lubricating oil release at the shallow-water recovery site. No long-term impacts would occur.	Diesel fuel and lubricating oil and other hazardous materials would be removed prior to transit. Appropriate procedures and equipment would be in place to minimize potential impacts to water quality during transit.	Diesel fuel and lubricating oil and other hazardous materials would be removed prior to relocation to minimize potential long-term impact to water quality.	Potential for continued slow release of diesel fuel and lubricating oil remaining on the vessel to affect localized water quality.
Marine Biological Resources	Minimal impact to Essential Fish Habitat or coral, marine mammals, migratory birds, or threatened or endangered species.	Minimal impact to Essential Fish Habitat or coral, marine mammals, migratory birds, or threatened or endangered species.	Minimal impact to Essential Fish Habitat or coral, marine mammals, migratory birds, or threatened or endangered species.	Minimal impact to Essential Fish Habitat, marine mammals, migratory birds, or threatened or endangered species.	Minimal impact to Essential Fish Habitat, marine mammals, migratory birds, or threatened or endangered species.	Potential impact from exposed cargo nets, fishing hooks and lines, rafts, and other obstacles.
Health and Safety	Appropriate health and safety procedures and equipment would be in place to minimize risk to worker and public safety.	Appropriate health and safety procedures and equipment would be in place to minimize risk to worker and public safety.	Appropriate health and safety procedures and equipment would be in place to minimize risk to worker and public safety. Activities would occur within existing restricted area, which would minimize risk to diver safety.	Appropriate health and safety procedures and equipment would be in place to minimize risk to worker and public safety.	Appropriate health and safety procedures and equipment would be in place to minimize risk to worker and public safety.	No impact
Hazardous Materials and Hazardous Waste	Procedures and equipment would be in place to minimize impacts from an unanticipated diesel fuel or lubricating oil release.	Procedures and equipment would be in place to minimize impacts from an unanticipated diesel fuel or lubricating oil release.	Procedures and equipment would be in place to minimize impacts from an unanticipated diesel fuel or lubricating oil release.	Oil and other hazardous materials would be removed prior to transit as practicable. Equipment and procedures would be in place to minimize impacts from an unanticipated diesel fuel or lubricating oil release.	Oil and other hazardous materials would be removed prior to relocation as practicable to minimize potential long-term impact.	Potential for continued slow release of diesel fuel or lubricating oil remaining on the vessel.
Airspace	Establishment of a temporary flight restriction would not impact airspace use.	Establishment of a temporary flight restriction would not impact airspace use.	Establishment of a temporary flight restriction would not impact airspace use.	Establishment of a temporary flight restriction would not impact airspace use.	Establishment of a temporary flight restriction would not impact airspace use.	No impact

ACRONYMS AND ABBREVIATIONS

ACRONYMS AND ABBREVIATIONS

BOD	biochemical oxygen demand
C	Celsius
CFR	Code of Federal Regulations
CINCPACFLT	U.S. Navy Commander In Chief, Pacific Fleet
DoD	Department of Defense
EA	Environmental Assessment
EEZ	Economic Exclusion Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESSM	Emergency Ship Salvage Material
F	Fahrenheit
FAA	Federal Aviation Administration
FL	flight level
GPS	Global Positioning System
IAP	Incident Action Plan
IC	Incident Commander
ICS	Incident Command System
ICAO	International Civil Aviation Organization
LAN	local area network
MDSU-ONE	Mobile Diving and Salvage Unit One
M/V	Marine Vessel
NPDES	National Pollutant Discharge Elimination System
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NOTMAR	Notice to Mariners
OSC	On-scene Coordinator
PCB	polychlorinated biphenyl
ppt	parts per thousand
ROI	region of influence
ROV	Remotely Operated Vehicles

SSN	Ship, Submerged Nuclear
USNS	United States Navy ship
USS	United States ship
WASP	Working Atmospheric Suit Prototype

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1.0
PURPOSE AND NEED

1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

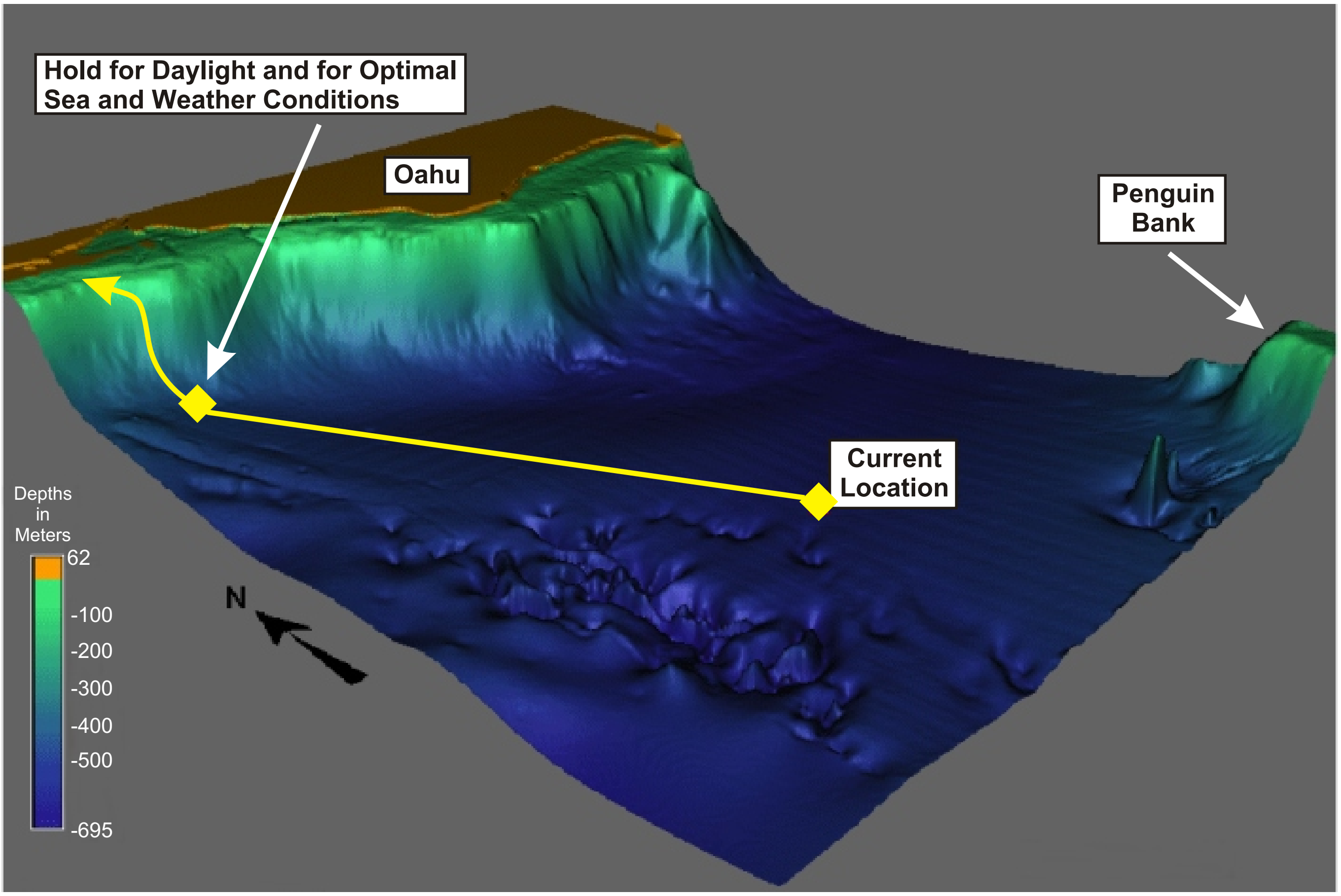
1.1 INTRODUCTION

The National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code Section 4321 *et seq*.); the Council on Environmental Quality regulations implementing NEPA (40 Code of Federal Regulations [CFR] Sections 1500-1508); Department of Defense (DoD) Instruction 4715.9, *Environmental Planning and Analysis;* and Naval Operations Instruction (OPNAVINST) 5090.1B, *Environmental and Natural Resources Program Manual* direct Navy officials to consider environmental consequences when making decisions to authorize or approve major federal actions. The Navy has complied with all applicable Executive Orders including consideration of the environmental effects of its actions outside the United States or its territories under the provisions of Executive Order 12114, *Environmental Effects Abroad of Major Federal Action*s. The Commander In Chief, U.S. Pacific Fleet (CINCPACFLT) has prepared this Environmental Assessment (EA) to analyze any potential environmental impacts associated with *Ehime Maru* relocation and recovery operations.

1.2 BACKGROUND

On February 9, 2001, USS *Greeneville* (SSN 772), a Los Angeles class submarine, collided with *Ehime Maru* (registration number 135174), a Japanese training and fishing vessel, approximately 9 nautical miles (17 kilometers) south of Diamond Head on the island of Oahu, Hawaii (figure 1-1). *Ehime Maru* sank in approximately 2,000 feet (600 meters[1]) of water. The vessel is resting upright on the seafloor at 21 degrees 04.8 minutes North latitude, 157 degrees 49.5 minutes West longitude, outside of the state of Hawaii waters. At the time of the sinking, 26 of the 35 crewmembers were rescued. Following an extensive air/sea search, and a sub-sea search and remote-controlled underwater visual inspection of the vessel, it is assumed that some, or all, of the nine missing individuals became trapped inside the vessel or went overboard as the ship went down.

1 Original measurements were received in either English or metric units and may have been approximations. For this reason, unless exact measurements were known, conversions throughout this document have typically used only one significant figure after calculations have been completed. For example, 1,000 feet is approximately equal to 300 meters, where the exact conversion would be 304.8 meters.



Source: U.S. Department of the Navy, 2001b

Current Location of *Ehime Maru*

Figure 1-1

Not to Scale

1_1CurrentLocation053101

Detailed remote camera and video surveys were conducted by the Navy, using Remotely Operated Vehicles (ROVs). The vessel is sitting upright on the seafloor but has obvious external hull damage. The most obvious exterior damage is in the forward port and starboard shell plating. The plating has visible buckling. In addition, because of the rapid sinking of *Ehime Maru*, and since the bottom of the vessel is not visible, experts suggest that a hole with an area of approximately 108 square feet (10 square meters) exists in the bottom of the hull at the stern of the ship. Also, it is assumed that major watertight bulkheads were damaged by *Greeneville*'s rudder, which allowed rapid flooding of *Ehime Maru*. Other obvious damage includes bending of the forward mast to port and minor shell plate buckling at the stern and bow. *Ehime Maru* sits with the stern buried up to 6 feet (2 meters) in the sandy bottom with the rudder and propeller not visible.

Although this recovery operation has been deemed technically feasible, the proposed engineering solutions are untested in this type of operation. Engineers and salvage experts have based their feasibility assessment upon estimates and calculations on the size of the hole in *Ehime Maru* and their considered opinion on the anticipated structural integrity of *Ehime Maru*. However, since they have done these calculations and estimates without having seen the damage to *Ehime Maru* (the vessel sits upright in 2,000 feet [600 meters] of water), there is some uncertainty as to the exact level of damage.

Although there are risks and potential structural damage that could prevent the Navy from successfully achieving its goal, the Navy is confident that it could lift and move *Ehime Maru* to a shallow-water site for recovery of the crewmembers and would make every reasonable effort to do so. At various critical points in the Proposed Action, structural failure could preclude continuation of the mission. Unplanned occurrences such as this would cause the Navy to reevaluate whether recovery operations should continue or be terminated based on feasibility and probability of crewmember recovery. Depending upon where a failure might occur and if the Proposed Action were stopped, the Navy would attempt to recover as many crewmembers, personal effects, and other objects as possible. To the maximum extent practicable, these objects would include the cargo nets, fishing hooks and long lines, rafts, rigging on the masts, and any other obstacles that could cause a future impact to the marine environment. Extreme structural damage, if present, could prevent the vessel from being moved intact and thus would prevent the Navy from completing the planned recovery operations. This recovery operation is not without risks, and there is no guarantee of success.

Because of the nature of the Proposed Action and its uniqueness, engineering methods continue to mature. As specific changes are developed they would be evaluated within the context of the Proposed Action. If the changes introduce a potential for environmental effects that are substantially different, then additional environmental documentation would be prepared.

The vessel's location at approximately 2,000 feet (600 meters) below the surface, its ship weight of approximately 830 tons (750 metric tons), and its damaged condition would make this the most challenging recovery effort the Navy has ever undertaken, as characterized in figure 1-2. The initial phases of the operation present the most technical difficulties; intact recovery of the vessel is likely but not certain.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.3.1 PURPOSE

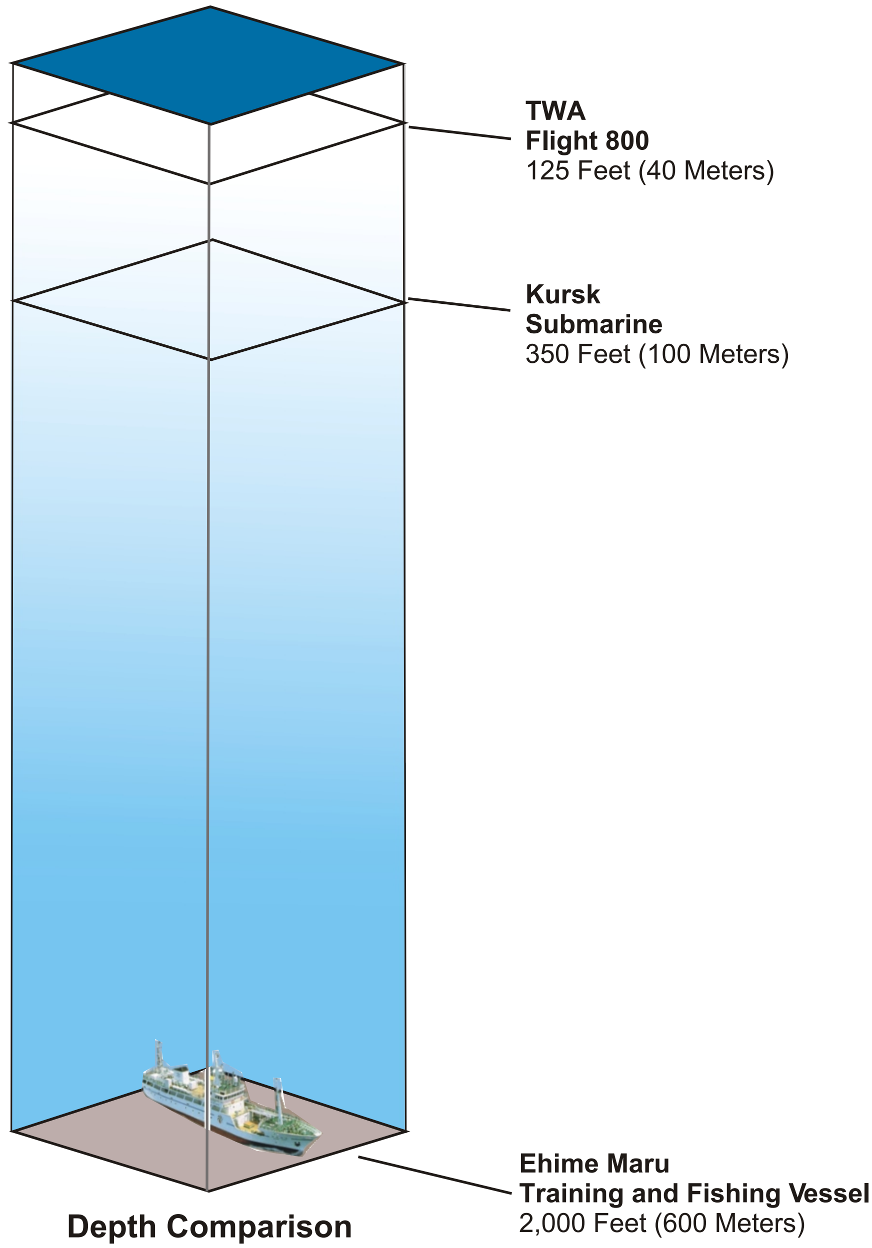
The purpose of the Proposed Action is the recovery of the crewmembers, personal effects, and certain unique characteristic components, such as the anchors, forward mast, placard, and ship's wheel from *Ehime Maru*, while limiting the impact on the environment. The Proposed Action would be a hazardous and complex deep- and shallow-water operation, because of the depth of the current location and the size of *Ehime Maru*. The proposed operation has been structured to maximize the probability of recovering crewmembers, personal effects, and unique characteristic components, while minimizing the risk to the divers, the environment, equipment, and other personnel involved. The purpose would also be to safely remove, to the maximum extent practicable, diesel fuel, lubricating oil, loose debris, and any other materials that may degrade the marine environment, and then relocate *Ehime Maru* to a deep-water site. This is not an operation to salvage the ship.

1.3.2 NEED

This action is needed to provide closure for the families of the missing crewmembers and their community. The vessel is currently at a depth of approximately 2,000 feet (600 meters) of water and is beyond diver capability to safely conduct recovery operations. In order to recover any crewmembers or personal effects, the ship would need to be relocated to a shallow-water site that optimizes diver safety and effectiveness.

1.4 AGENCY SUPPORT

Although the U.S. Navy is the proponent for the action, the complexity and short schedule for this action requires the active participation of and support from relevant State of Hawaii and U.S. government environmental agencies throughout the process. State agencies include the State of Hawaii Department of Health, Department of Transportation, and Department of Land and Natural Resources. Federal agencies include the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service and Office of Response and Restoration, the Federal Aviation Administration (FAA), the U.S. Coast Guard, the U.S. Army Corps of Engineers, Honolulu District, and the U.S. Environmental Protection Agency. Technical expertise from these agencies and the data they provided has been used in addition to the normal consultation required to determine the potential for environmental impacts and to develop plans to minimize those impacts.



Comparison with Other Recovery Operations

Figure 1-2

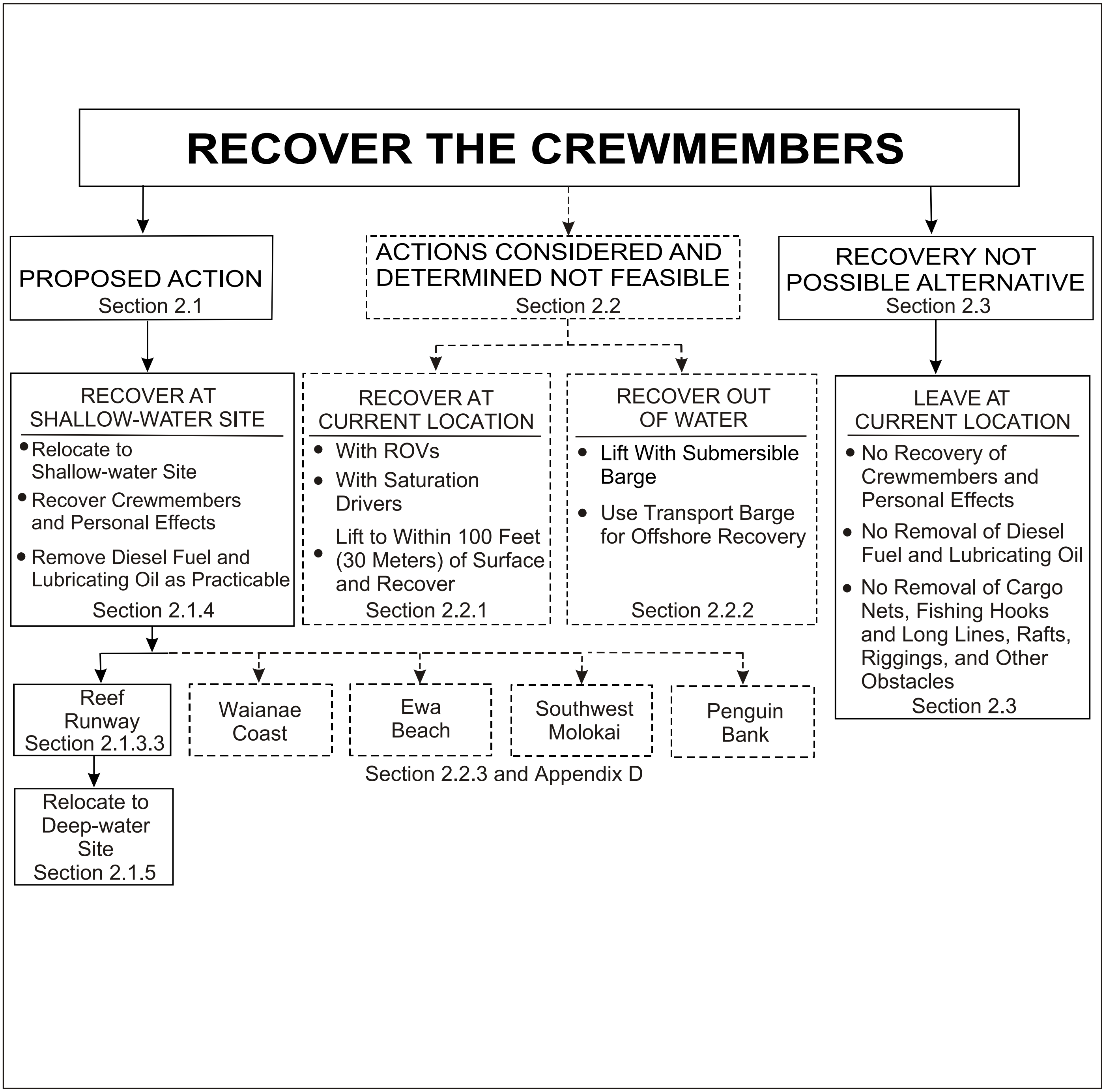
Not to Scale

1_2ComparisonOperations051501

1.5 DECISIONS TO BE MADE

The decisions to be made, based on the analysis in this EA and public and agency input, are whether and how to proceed with the *Ehime Maru* recovery operation. The decision would seek to minimize risks to divers, operations personnel, and the public and minimize impacts to the environment. The decisionmaker for the Proposed Action is CINCPACFLT. Figure 1-3 is a diagram of the other decisions that have been or would be made during the various phases of the recovery operation.

The Executive Order 12114-related decision to be made by the Navy is whether to relocate *Ehime Maru* to a deep-water site in the open-ocean environment outside U.S. territorial waters.



LEGEND

——— Alternatives Considered

- - - - - Decisions (and Sites) Considered but Determined Not Feasible or Appropriate

Decisions to Be Made

Figure 1-3

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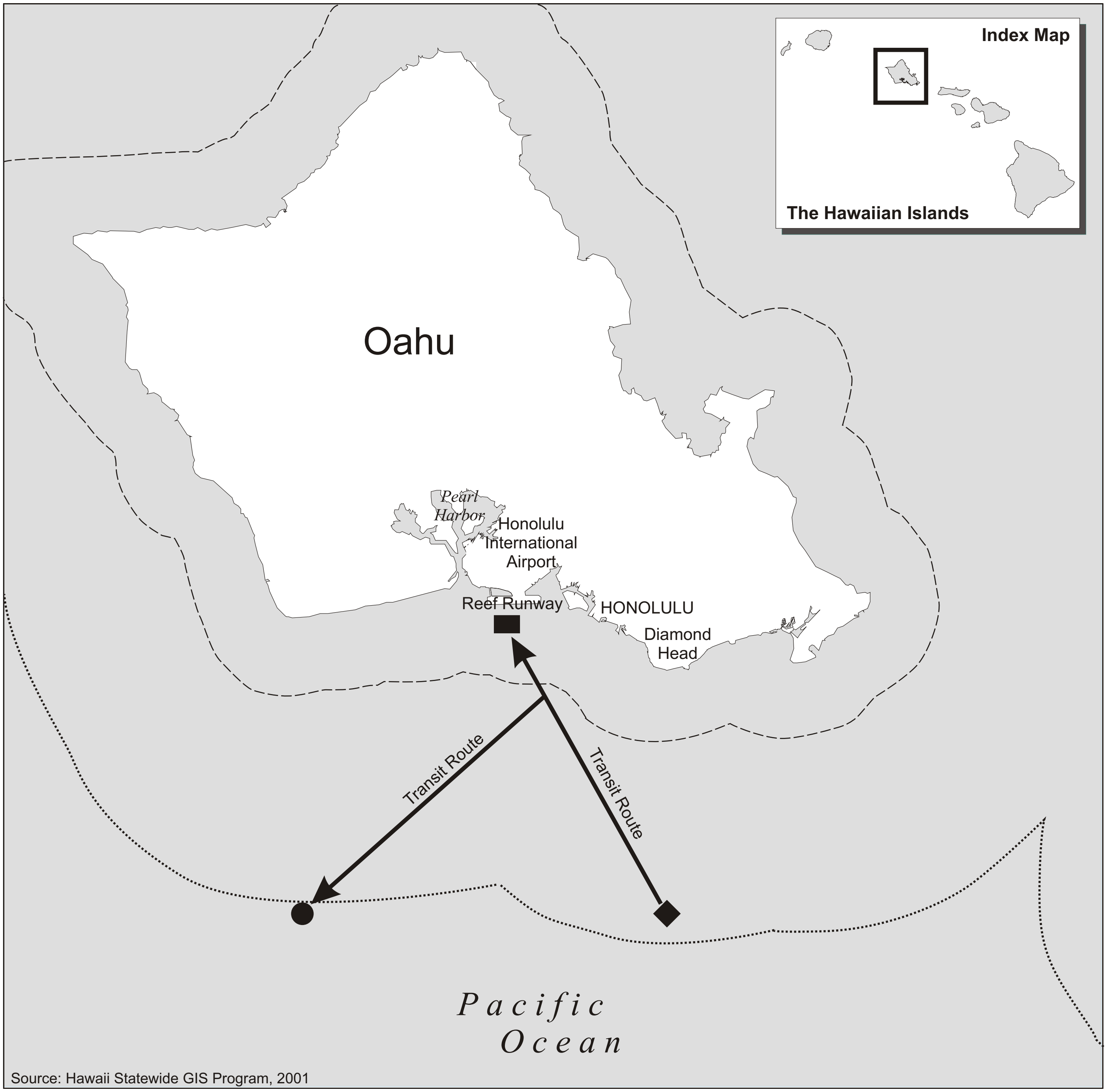
2.0
DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The U.S. Navy proposes to recover to the maximum extent practicable *Ehime Maru* crewmembers, personal effects, and certain characteristic components unique to *Ehime Maru*, such as the anchors, forward mast, placard, and ship's wheel, by moving the vessel to a shallow-water area to permit safe diver access and recovery operations. The Navy would use a specially-equipped offshore construction vessel to lift and move *Ehime Maru* from its current location. Flexible lifting plates would be placed under *Ehime Maru* to lift it from the seafloor using linear winches mounted on the heavy-lift vessel. *Ehime Maru* would then be transported, while suspended from the heavy-lift vessel approximately 100 feet (30 meters) above the seafloor, to a shallow-water recovery site approximately 115 feet (35 meters) deep. *Ehime Maru* would then be placed on the seafloor, and skimmer systems and containment booms would be pre-positioned to contain any diesel fuel or lubricating oil released. After *Ehime Maru* is stable, the heavy-lift vessel would be replaced by an ocean-going barge that would serve as a work platform for diving operations. Navy and Japanese divers would enter the hull and attempt recovery of crewmembers, any personal effects, and other uniquely characteristic components found inside. They would also safely remove remaining diesel fuel and lubricating oil to the maximum extent practicable. The barge would then lift *Ehime Maru* from the seafloor. The barge would relocate *Ehime Maru* to a deep-water site outside of state of Hawaii waters with a depth of at least 1,000 fathoms (6,000 feet [1,800 meters]) and outside the limit of U.S. territorial waters (figure 2-1).

One shallow-water recovery site and one deep-water relocation site are under consideration as part of the Proposed Action. These sites have been analyzed in detail in this EA. The Recovery-not-possible Alternative, which would leave *Ehime Maru* at its current location and in its present condition, will also be considered and analyzed. Under this alternative, the recovery operation would not be initiated and *Ehime Maru* crewmembers, personal effects, and certain characteristic components would not be recovered, and no diesel fuel or lubricating oil would be removed from the vessel. The deck also would not be cleared of cargo nets, fishing hooks and long lines, rafts, rigging on the masts, and any other obstacles that could cause a future impact to the marine environment.

Three alternative methods of recovering the crewmembers were considered but determined not to be technically feasible or safe. Thus, they were not studied in detail for analysis in this EA. These alternatives were deep-water recovery at the present site, recovery while the vessel was lifted and suspended from the heavy-lift vessel, and recovery out of water. Four additional shallow-water recovery sites were also considered but not analyzed because of safety and environmental concerns. These unacceptable alternatives are described in section 2.2.



LEGEND

- ◆ Current Location
- ■ Reef Runway Shallow-water Recovery Area
- ● Deep-water Relocation Site (Beyond the 1,000-fathom contour)
- ········ U.S. Territorial Waters (12 Nautical Miles)
- – – – – Hawaii State Waters (3 Nautical Miles)

NORTH

No Scale

Ehime Maru Current Location, Reef Runway Shallow-water Recovery Area, and Deep-water Relocation Site

Figure 2-1

2_1RelocationSite053101

2.1 PROPOSED ACTION

The overall effort consists of phases beginning with a feasibility study (appendix G), followed by this Environmental Assessment. The Proposed Action involves the remaining phases: mobilizing recovery forces, using ROVs to place lifting plates under the hull at the current location, deep-water lift and transit to a shallow-water recovery site approximately 115 feet (35 meters) deep including a post-lift ROV survey at the current location, crewmember recovery and diesel fuel and lubricating oil removal, and relocation of the vessel to a deep-water site. (Naval Sea Systems Command, 2001d)

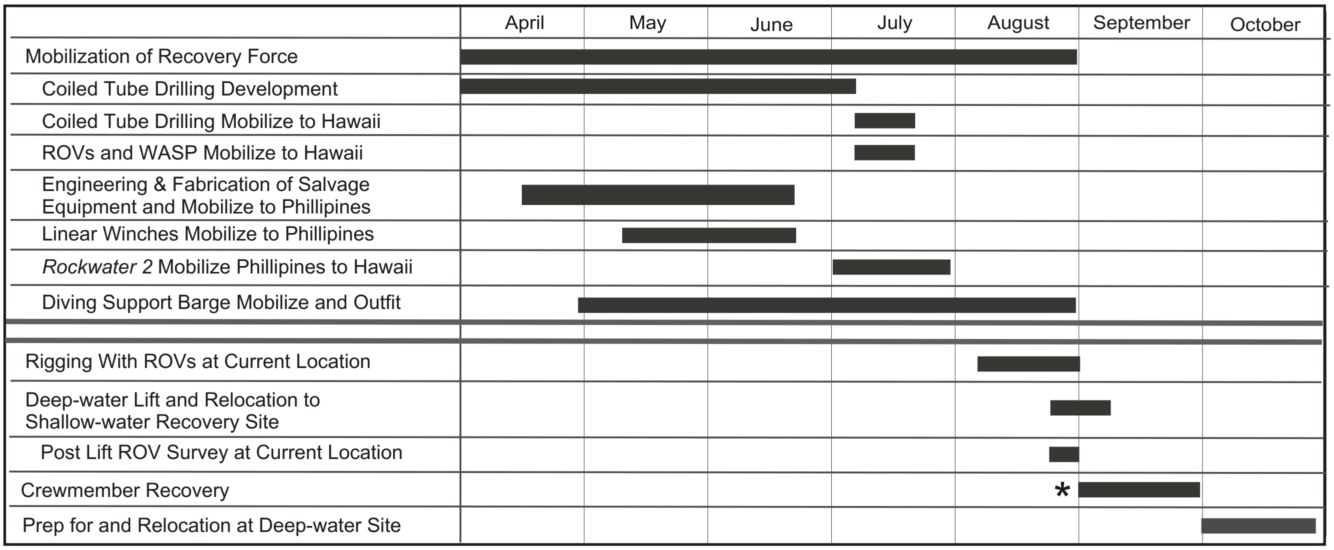
The recovery plan would include provisions for control of anticipated releases of oil. To further ensure timely and effective response actions and protection of the environment, an Incident Action Plan (IAP) has been developed (appendix F). The IAP describes resources and procedures for control of any unanticipated releases, and has been developed in advance to address unanticipated releases of diesel fuel and lubricating oil. The IAP and its implementing organization, the Unified Command, are described more fully in section 2.1.4.3. The Navy recovery plan would include use of Naval Sea Systems Command emergency response equipment, as well as local commercial response equipment, such as the oil spill response vessel *Clean Islands*. The Navy's operation orders for the recovery operation would require actions developed in the Proposed Action to be implemented. If a situation develops outside the Proposed Action, then the IAP would be used and modified as necessary by the Unified Command after consultation with the Navy. The IAP would be subject to review and approval by the members of the Unified Command, which includes Navy, Coast Guard, and State of Hawaii representatives. Japanese officials would be invited to observe the operations of the Unified Command.

The Navy would obtain appropriate state and federal permits. The Navy would also follow applicable federal requirements for *Ehime Maru* recovery and relocation.

2.1.1 MOBILIZING RECOVERY FORCES

Mobilization of recovery forces would include the acquisition, charter, rent, manufacture, and movement of all equipment necessary to support the operation. Figure 2-2 shows an overall notional timeline leading to the final phase, the deep-water relocation of *Ehime Maru* by the end of October 2001. The mobilization schedule for July is driven by the necessity to take advantage of optimal weather conditions for recovery and relocation operations in August through October. However, since this operation is unique, the timeline is subject to change due to unforeseen or uncontrollable circumstances. The major equipment that would be required to perform the recovery operation includes the following:

- Heavy-lift vessel
- Ocean-going barges and tugs
- Coiled tube drilling system
- Two underwater work-class ROVs



* Starts 48 hours after relocation to shallow-water recovery site

Representative Schedule for Recovery and Relocation Activities

Figure 2-2

- Working Atmospheric Suit Prototype (WASP) One Atmosphere Suit (a deep-water diving suit for emergency use only)
- Specially designed and fabricated equipment including pulleys, weights, spreader assembly, lifting frame, and other support hardware
- Heavy lift linear winches
- Lifting wire

Commitment for the floating assets is critical, specifically for the heavy-lift vessel, *Rockwater 2*, shown in figure 2-3. As shown in the timeline, the systems requiring a long lead-time for acquisition, testing, and transit include the coiled tube drilling system, winches, and the engineering, fabrication, and procurement of special recovery equipment. Naval Sea Systems Command began acquisition of these systems via contract with a contractor experienced in deep ocean operations. The acquisition would be completed in time to meet the required shipment date for transport to Hawaii. Equipment would be ready for shipment in mid-June. The shipment to Hawaii would take approximately 3 weeks. All equipment, including the winches and wire, would be staged in Hawaii by mid-July to complete outfitting *Rockwater 2*.

The ROVs and the WASP, as shown on figure 2-4, are currently located in Houston, Texas. They are being shipped over land to California and would arrive in Hawaii in mid-July on board anchor-handling tugs or barges. The vessels would also have on board the coiled tube drilling system and other salvage support equipment. *Rockwater 2* would arrive in Hawaii for final outfitting in mid-July and would be ready to complete the deep-water lifting operation by August 2001. The Navy and the U.S. Fish and Wildlife Service would cooperate by taking prudent measures to minimize the potential importation of alien species.

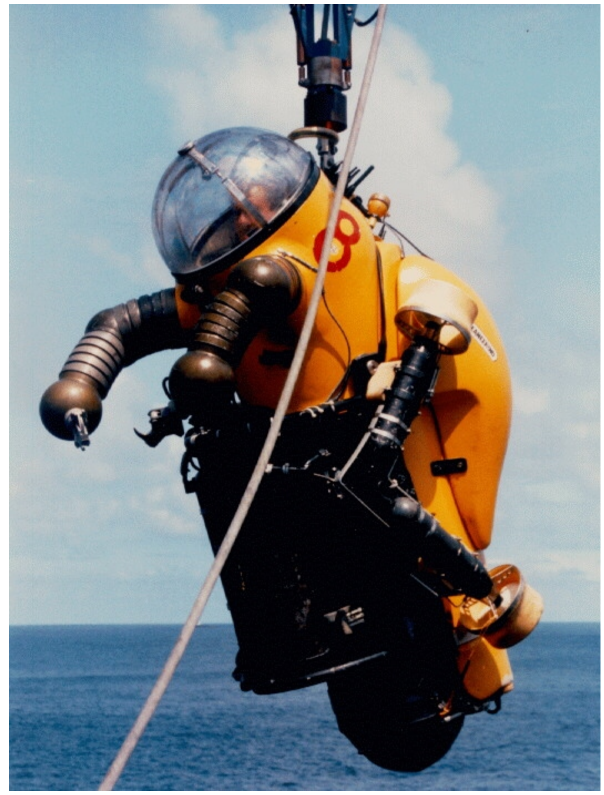
The United States has invited the Government of Japan to participate, and they have expressed an interest in providing the Japanese research vessel *Kairei* and the ROV *Kaiko* (figure 2-4) for the post-lift inspection. The U.S. Navy ROV *Deep Drone* and a support vessel would be used if the Japanese ROV is not available.

Additional assets and equipment would be required to support the divers during the crewmember recovery, the potential diesel fuel and lubricating oil removal, and relocation. A Navy contractor would supply an ocean-going barge with ballast lift capability, support tugs, and related equipment and recovery support expertise. The contractor would mobilize the barges and tugs from the West Coast of the United States in mid-August and begin outfitting of the equipment for diving support, lift support, and diesel fuel and lubricating oil removal in late August. The contractor would provide support equipment including mooring systems, crane, power, accommodations, and berthing services. The Navy's Mobile Diving and Salvage Unit One (MDSU-ONE) would provide the divers, diving equipment, and services. The barges and tugs would support the crewmember recovery operations until completion, which is currently anticipated for October.

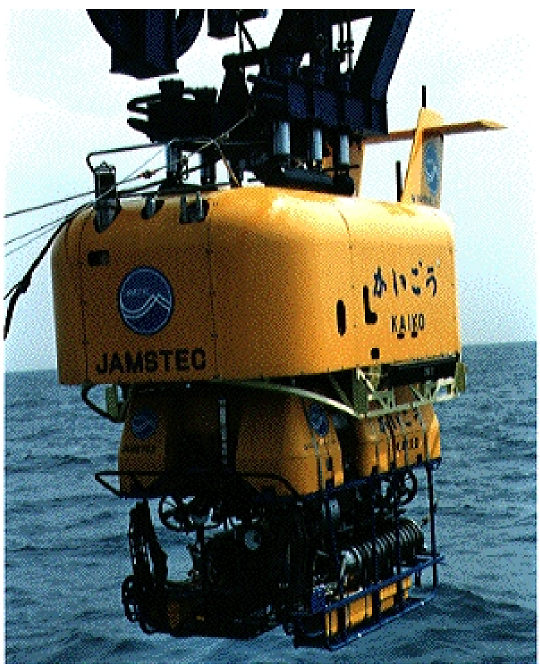
Rockwater 2
Heavy-lift Vessel

Figure 2-3

Remotely Operated Vehicle *Deep Drone*



Working Atmospheric Suit Prototype (WASP)



Japanese Remotely Operated Vehicle *Kaiko*

Japanese Research Vessel *Karei*

Deep-water Recovery Assets

Figure 2-4

2.1.2 LIFT PREPARATION WITH ROVS AT CURRENT LOCATION

This phase of the operation would include preparation of *Ehime Maru* for lifting from the 2,000-foot (600-meter) depth. The operation would be conducted primarily by the lift vessel, *Rockwater 2*, with assistance from the anchor-handling tug. *Rockwater 2* is a multi-purpose support vessel with dynamic positioning capability, a wave-compensated crane, and other assets necessary for the operation. It would be outfitted with special drilling equipment, winches, lifting wire, two work-class ROVs, the WASP, and all fabricated hardware for the operation. The rigging would be performed in the sequential steps as described in the following sections. The Navy would install shields on lighting to minimize the upward reflection of any outdoor lighting used in preparation for the next day's activities.

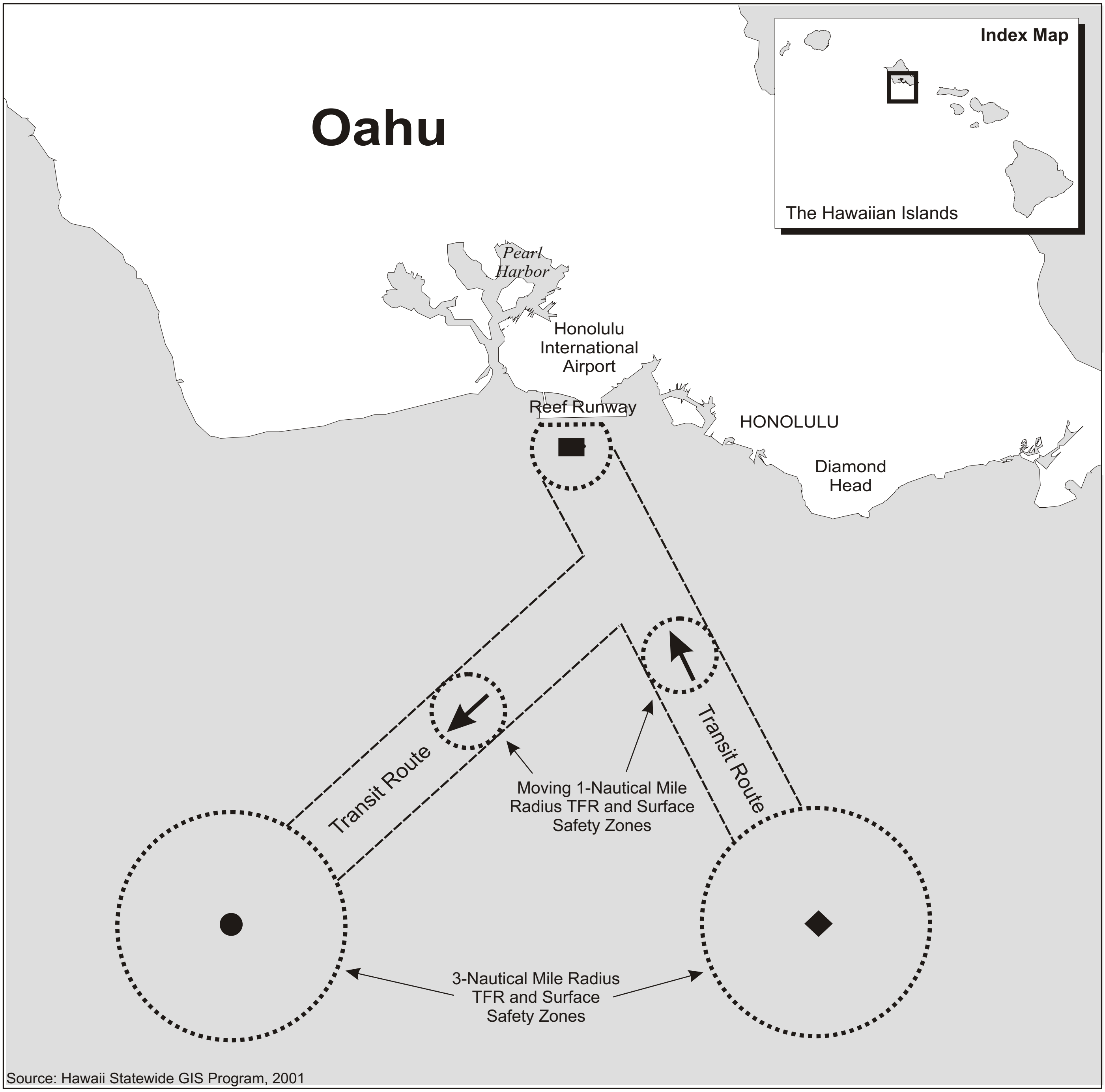
A temporary flight restriction and a Coast Guard surface safety zone would be established with a 3-nautical-mile (approximately 6-kilometer) radius around the lift preparation area (figure 2-5) to minimize the potential intrusion of watercraft and aircraft during lift and relocation activities. The temporary flight restriction would extend up to an altitude of 2,000 feet (approximately 610 meters). The Navy would request dedicated warning Notices to Mariners (NOTMARs) and Notices to Airmen (NOTAMs) for ships and aircraft, respectively, to avoid the lift preparation area. The Coast Guard would establish a surface safety zone, issue NOTMARs, and enforce the surface safety zone as required to keep other vessels clear of the area. The FAA would establish a temporary flight restriction and issue NOTAMs. The temporary flight restriction would be enforced by the FAA.

2.1.2.1 Inspection of *Ehime Maru* by ROV

Before lift preparation a thorough inspection of *Ehime Maru* would be performed by at least one of the ROVs to finalize details for the rigging. During this inspection, a number of tests and trials would be performed, including scouring out the area beneath the bow of *Ehime Maru* with water jets. The ROVs would also be used to perform a visual survey to determine if there are any marine resources in the area that should be avoided. Resource agency observers would provide assistance in making the determination.

2.1.2.2 Removal of Materials

The ROVs would be used to remove and recover any items attached to or around *Ehime Maru,* including cargo nets, fishing hooks and long lines, rafts, and rigging on the masts. No fishing nets were on board. To the maximum extent practicable, the deck would then be cleared of all other obstacles, such as the masts, that could cause an impact to the marine environment or jeopardize the safety of the recovery operations. The forward mast would be removed by the ROVs. To remove the center mast, a 1.5-pound (0.7-kilogram) U-shaped linear charge would be placed at the base to cut it from the deck. The members of the Unified Command would be notified to be on standby before the shaped charge is used. An alternate method would use a plasma rod to burn through the metal of the center mast, so it could either be bent over or removed. Both masts, if removed, would be taken to the surface by the ROV.



LEGEND

- Current Location
- Reef Runway Shallow-water Recovery Area
- Deep-water Relocation Site
- Temporary Flight Restriction Space Up to 2,000 Feet in Altitude and Surface Safety Zone
- Transit Route

NORTH

No Scale

Temporary Flight Restriction and Surface Safety Zone

Figure 2-5

2_5SurfaceAirRestrict053101

2.1.2.3 Placement of Lifting Plates and Aligning Weights

Rockwater 2 would place various pieces of equipment on the seafloor adjacent to *Ehime Maru* in preparation for installation of the lifting plates (figure 2-6). The lifting plates are approximately 66 feet by 5 feet by 0.75 inches (20 meters by 1.5 meters by 19 millimeters), with bridle terminations on each end. Placement and alignment would be accomplished using the wave-compensated crane to dampen the effect of ocean waves, and a precision navigation system.

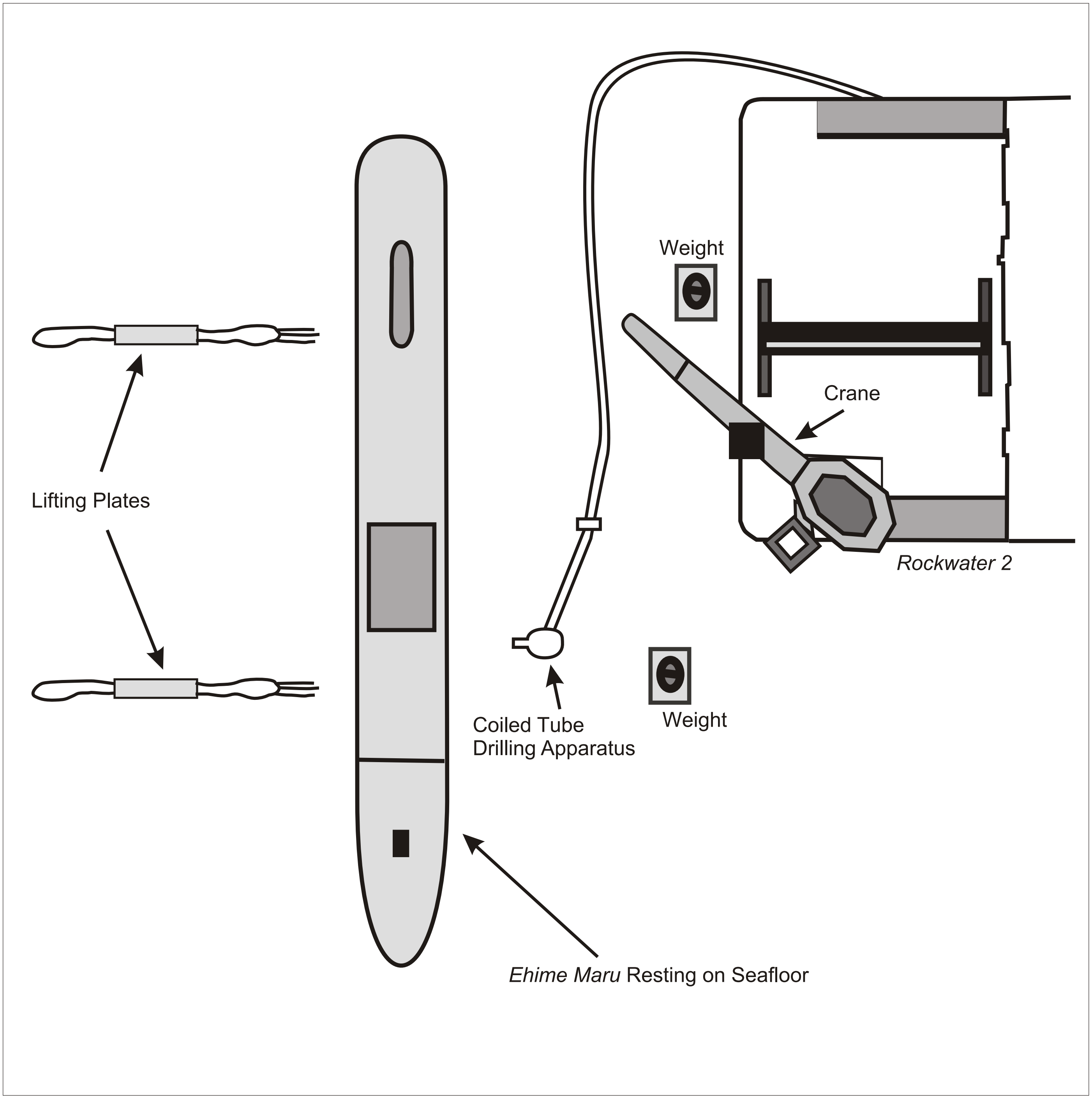
2.1.2.4 Coiled Tube Drilling

A coiled tube drilling system, shown schematically in figure 2-7, would be used to drill beneath the hull of *Ehime Maru*. The system is operated from the surface, with the drilling head positioned on the seafloor. As shown on the figure, a tunnel (approximately 14 inches [350 millimeters] in diameter) would be drilled beneath *Ehime Maru* using the directional capability of the system. Additional tunnels may be drilled parallel to the original tunnel depending on the testing that would be performed in Houston before mobilization. The process would be repeated for both forward and aft lifting plate locations.

2.1.2.5 Lifting Plate Installation

After the tunnels are drilled beneath *Ehime Maru*, messenger lines would be used to attach high-strength wire ropes to the ends of the lifting plates (figure 2-8). The lifting plates would then be pulled under the hull through the drilled tunnels using either *Rockwater 2*'s linear winch or the crane on the anchor-handling tug. A water-jetting assembly would be attached to the end of the lifting plates to assist in the extrusion of the plates through the sediment beneath *Ehime Maru*.

This phase is one of the most critical in the operation. A contingency plan has been developed in case the drilling operation is not successful. The contingency plan includes lifting the stern of *Ehime Maru* by *Rockwater 2* to enable the lifting plates to be pulled under the hull. This method requires scouring away the seafloor beneath the bow of *Ehime Maru* and then using a sling to lift the stern about four degrees, allowing the two lifting plates to be pulled under the hull. This method could increase the risk of further damage to the hull and subsequently increase the potential for a release of diesel fuel and lubricating oil. A surveillance helicopter and a skimmer system would be on site should this plan be chosen as the method to install the lifting plates.

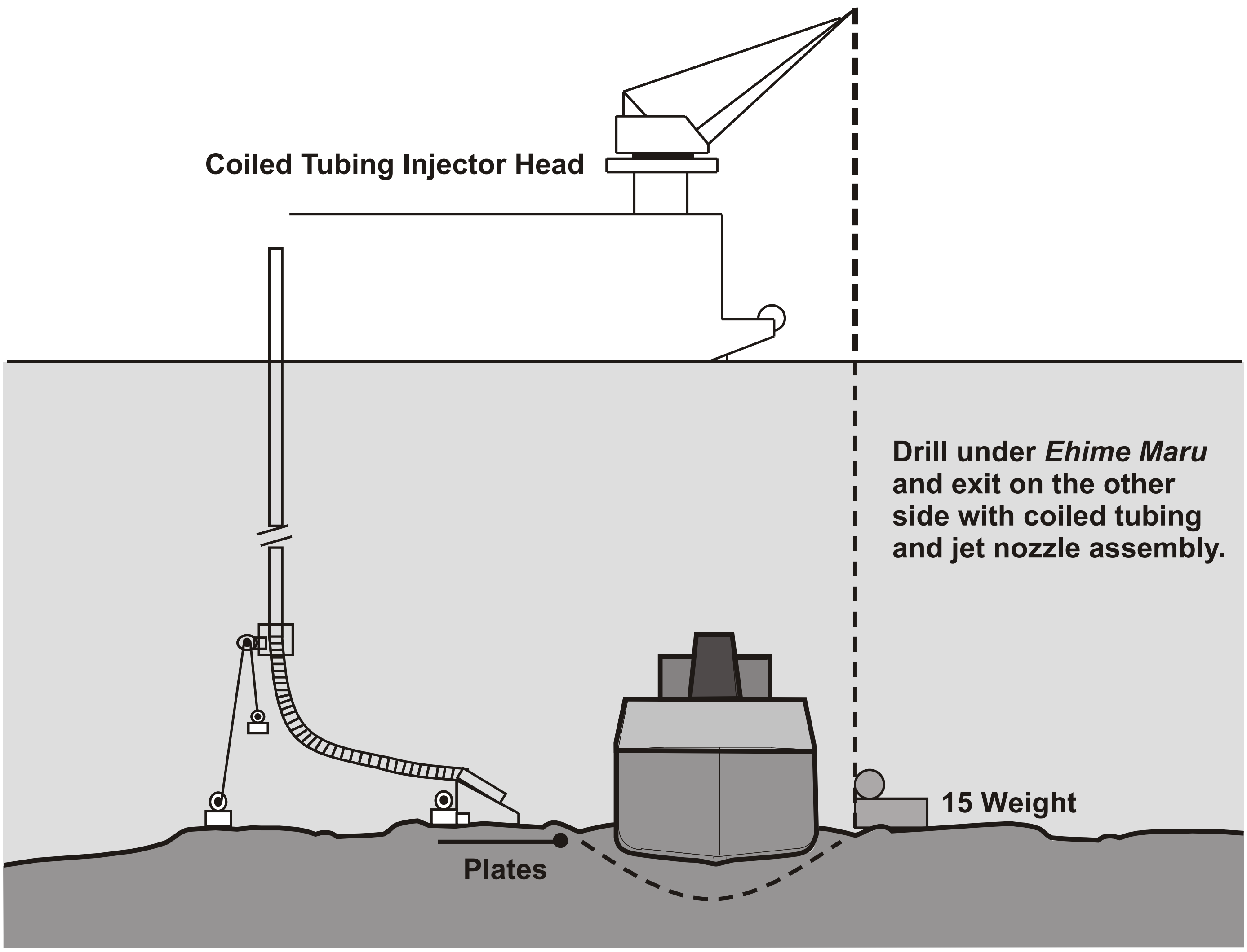


Plan View of Lifting Plates and Anchors on the Seafloor

Figure 2-6

No Scale

2_6PositioningPlates052101



Coiled Tube Drilling System

Figure 2-7

No Scale

2.1.2.6 Installation of Spreader Assembly

The next step in the rigging process would be installation of the spreader assembly (figure 2-8). The spreader assembly, which would distribute the weight of *Ehime Maru*, is buoyant to facilitate rigging. The assembly would be lowered with the wave-compensated crane and positioned over *Ehime Maru* at a predetermined location. When properly positioned, the two lifting plates would be attached to the spreader assembly using messenger lines from *Rockwater 2*. ROVs would be used extensively during all activities in this phase. Figure 2-8 shows the spreader assembly positioned above *Ehime Maru* and the ends of the lifting plates in the process of being attached to the spreader.

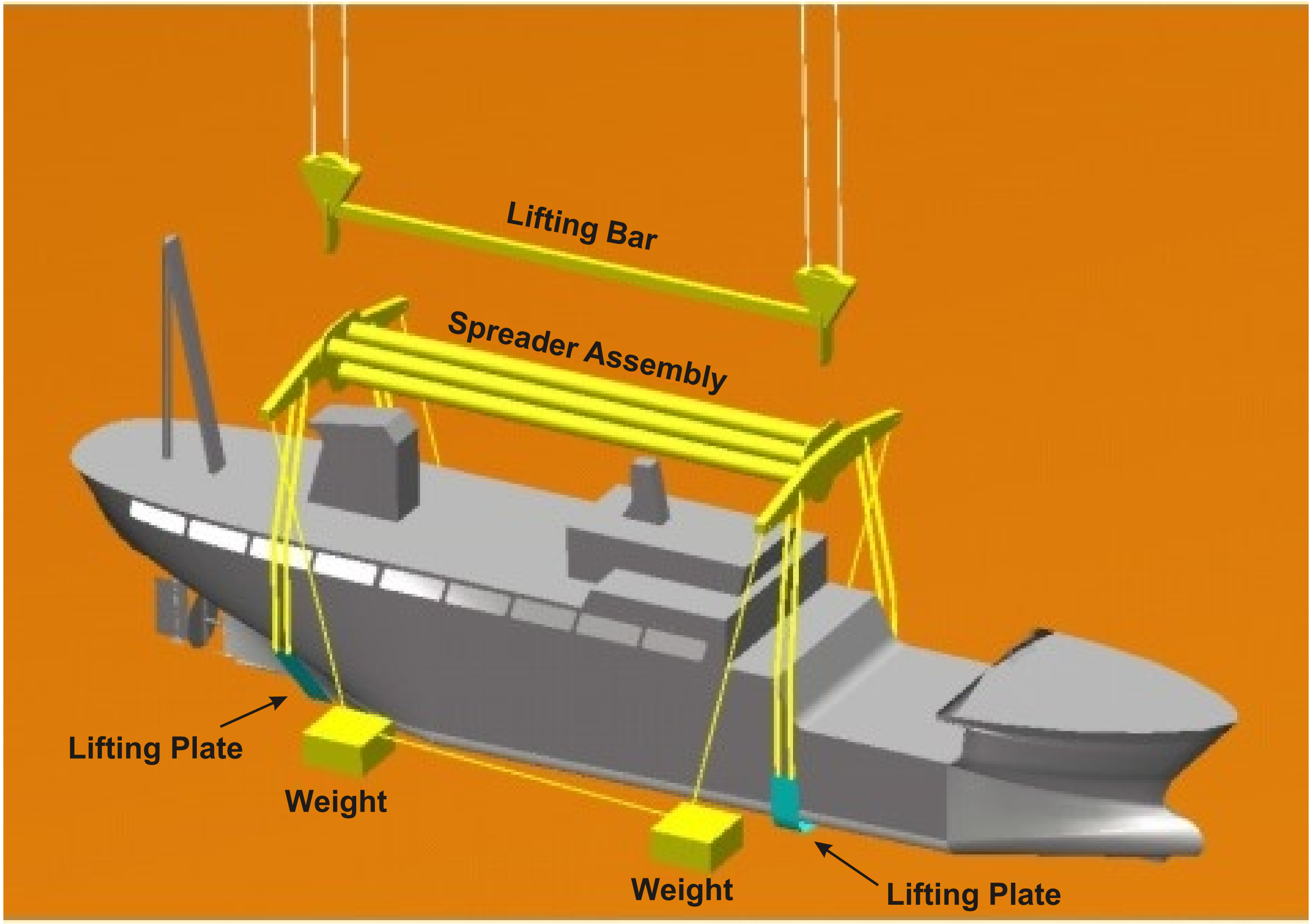
2.1.2.7 Lowering the Lifting Bar

The final step in the rigging process would be lowering the lift wires to the spreader assembly and completing the connection between *Rockwater 2* and *Ehime Maru*. The winches would let down the lift wires, lowering the lift bar to the spreader assembly. The ROVs would assist in aligning the lift bar with the spreader assembly and in making the final connections between the two. Once the lifting bar is attached to the spreader assembly, *Ehime Maru* would be ready for lifting.

2.1.3 DEEP-WATER LIFT AND TRANSIT TO THE SHALLOW-WATER RECOVERY SITE

This phase of the operation would include making the initial lift of *Ehime Maru* from the seafloor, inspecting the vessel while it is suspended approximately 100 feet (30 meters) above the seafloor, transiting to the shallow-water recovery site along a previously determined route while maintaining a distance of approximately 100 feet (30 meters) from the seafloor, and placing the hull on the seafloor at the shallow-water recovery site. Immediately after the initial lift, *Ehime Maru* would be inspected underneath to assess its integrity before transport. Exact transit routes would be determined based on a recent bathymetric survey. Throughout each of the following steps of this phase, one of the ROVs would be deployed to monitor the condition of the hull and lifting rig. The Navy would also videotape the operations at the surface using both surface and aerial cameras.

Subsequent to the successful lift of *Ehime Maru*, any personal effects that remain on the seafloor would be recovered with the ROV manipulators and a collection basket. Recovered items would be placed in the basket and subsequently brought to the surface. All personal effects would then be inventoried, washed with fresh water, placed in appropriate containers, and turned over to the City of Honolulu Medical Examiner for transfer to the Japanese Consulate. In addition to the recovery of personal effects, any remaining items that may endanger the marine environment (for example, cargo nets, long lines, and fishing hooks) would also be recovered.



Installation of Lifting Plates, Spreader Assembly, and Lifting Bar

Figure 2-8

No Scale

2_9AssemblyInstallation052801

The Navy would deploy multiple buoys approximately 30 days before the deep-water lift to measure wind speed and direction and sea-state data. The buoys would be placed at strategic locations, such as the coral fringe approximately 2 to 3 nautical miles (4 to 6 kilometers) from shore and upcurrent and downcurrent from the shallow-water recovery site.

2.1.3.1 Transit Routes

The routes between the current location of *Ehime Maru*, the proposed shallow-water recovery site, and the proposed final deep-water relocation site were surveyed using a precision fathometer coupled to a global positioning system. This information would enable the *Rockwater 2* to proceed safely along the prescribed route. One of the ROVs would be deployed to monitor the condition of *Ehime Maru* and the rigging gear. The ROV would use its sonar to ensure that *Ehime Maru* remains suspended approximately 100 feet (30 meters) off the seafloor and would not collide with any outcroppings, rocks, or cliffs. The transit speed would be approximately 1 knot (approximately 2 kilometers per hour). The vessel would only be moved during daylight and during favorable weather conditions to ensure the safety of operation personnel, to minimize the potential for mishaps, and to ensure detection of any “sheen” resulting from the release of diesel fuel or lubricating oil. Data from surveys by USNS *Sumner*, a U.S. Navy oceanographic vessel, have been used to prepare bathymetric charts, which were used to determine the proposed transit routes.

At the coral fringe, approximately 2 to 3 nautical miles (4 to 6 kilometers) from shore, the seafloor abruptly rises approximately 1,500 feet (450 meters) (see figure 1-1). At this point the heavy-lift vessel would delay moving any closer to shore. The Navy would time the final movement to the shallow-water recovery site to coincide with favorable wind speed and direction, currents, and tides. This extensive sea-state analysis, as well as real-time spot weather forecasts, would allow the Navy to choose an optimal time for the vessel’s movement to the shallow-water recovery site.

A temporary flight restriction and a Coast Guard surface safety zone would be established with a 1-nautical-mile (approximately 2-kilometer) radius, centered on the heavy-lift vessel. The temporary flight restriction would extend to an altitude of 2,000 feet (approximately 610 meters). This temporary flight restriction would be issued and enforced by the FAA. The Navy would request the dedicated warning NOTMARs and NOTAMs for ships and aircraft, respectively, to avoid the transit route. The Coast Guard would issue NOTMARs and enforce the surface safety zone as required to keep other vessels clear of the area until the vessels reach the Naval Defense Sea Area, at which point the Navy would then enforce the surface safety zone.

2.1.3.2 Sea-state Limitations During the Deep-water Lift and Transit

The transit operation would be conducted when forecasted wave heights do not exceed safe operating limits of the lifting equipment. Desired minimum winds would be 10 to 12 knots (approximately 20 to 24 kilometers per hour), depending upon currents. Currents would be monitored with appropriate instrumentation to provide near real-time measurements.

2.1.3.3 Oil Release Preparedness during Lift, Transit, and Placement at the Shallow-water Recovery Site

Ehime Maru had approximately 65,000 gallons (25,000 liters) of diesel fuel, approximately 1,200 gallons (4,500 liters) of lubricating oil, and 46 gallons (182 liters) of kerosene on board at the time of the collision. It is assumed that the force of the collision opened the vessel's bulkheads and that fuel tanks and other closed containers were crushed by the enormous change in pressure caused by the rapid sinking of the vessel. Based on aerial observations for 3 days following the collision, the Navy has conservatively estimated that the volume potentially remaining, and thus the maximum credible release, would be approximately 45,000 gallons (170,000 liters).

Baseline water samples would be taken at the shallow-water recovery site prior to operations. Baseline samples would also be taken of the diesel fuel *Ehime Maru* used. Recovery personnel would try to obtain a sample of any remaining diesel fuel or lubricating oil from *Ehime Maru*. In the event of a release, initial and periodic sampling for total hydrocarbons and benzene would be taken.

The diesel fuel on *Ehime Maru* is a non-persistent fuel, meaning that if released, natural weathering processes would cause it to evaporate and disperse relatively quickly (appendix I, part 2). Diesel fuel, even at a depth of 2,000 feet (600 meters), would be expected to rise to the sea surface and be subject to surface winds, mixing by waves, and warmer temperatures, thus enhancing evaporation. With anticipated local weather, wind, and sea-state conditions, and no emergency response effort, approximately 65 percent of a significant release would be removed (into the air and into the water column) by natural processes in the first 5 hours following release. After 10 hours, less than 10 percent of the released diesel fuel would remain on the water's surface. The diesel fuel would naturally evaporate and disperse into the water column and would be diluted to harmless, non-detectable levels. Unless it is dispersed in very shallow water, there is sufficient water volume to adequately dilute the dispersed fuel. The diesel fuel may display some toxic characteristics, and until diluted may be expected to have an impact on marine life in the immediate vicinity of the release. Releases would be contained or recovered before they impact the sensitive resources in Hawaii's nearshore waters.

The lubricating oil on *Ehime Maru* is a more persistent oil, but the Navy anticipates very little of the 1,200 gallons (4,500 liters) would remain due to the location and likely extent of the collision damage. The Navy would be prepared to accelerate natural dispersion of any diesel fuel or lubricating oil released using chemical dispersants, only if the Coast Guard determines it is necessary or if such accelerated dispersion would result in a net environmental benefit. Chemical dispersants would only be applied if mechanical measures (containment booms and skimmer systems) are not effective, and only with the approval of the federal On-Scene Coordinator (OSC), in accordance with applicable provisions of the Regional and Area Contingency Plans.

Despite the low probability of its occurrence, the Navy would be fully prepared to respond to greater than the maximum credible release of 45,000 gallons (170,000 liters) with on-scene booms, skimmers, sorbents, and dispersant capability. Booms would be pre-positioned near the shallow-water recovery site, and any anchors would avoid areas of coral, seagrasses, and other sessile marine life. The booms would be attached to tag lines that could be easily moved to a potential release site.

The Navy has three open-ocean skimmer systems in Pearl Harbor, each with a recovery capacity of 57,000 gallons (220,000 liters) per day and adequate storage capacity. The Navy has also arranged to deploy the local industry oil spill cooperative's oil spill response vessel *Clean Islands* as required. *Clean Islands* has two on-board skimmers with a daily recovery capacity of approximately 62,000 gallons (approximately 235,000 liters) per day. During the lift and relocation phase of the recovery operation, two Navy skimmer systems and *Clean Islands* would be on scene, with the one remaining Navy skimmer on standby. In addition, an open-ocean containment boom would be deployed at the shallow-water recovery site and positioned as required to contain possible releases or to divert them to the skimmer systems.

The Navy would survey the proposed shallow-water recovery site for the presence of coral and seagrass. The survey would be documented with videotape. This survey would also determine if there are any unknown man-made structures (such as cables and pipelines) or unexploded ordnance in the area. If structures or unexploded ordnance is found, they would be marked and avoided.

Representatives from the U.S. Fish and Wildlife Service would survey bird habitats and populations at the Marine Corps Base Hawaii at Kaneohe Bay, Kaena Point, a point on the south shore of Oahu, and the Kilauea National Wildlife Refuge on the island of Kauai, before and after operations. U.S. Fish and Wildlife Service personnel would provide technical support at the current location of *Ehime Maru* and during transit to the shallow-water recovery site should birds should become oiled. In addition, U.S. Fish and Wildlife Service and/or National Marine Fisheries Service personnel would be aboard an oil skimmer to observe and collect any distressed birds that come in contact with oil. If at all possible, an oiled bird stabilization unit would be established at a convenient location. In the unlikely event wildlife (birds, mammals, and sea turtles) become oiled, the National Marine Fisheries Service would be notified. The International Bird Rescue Research Center would be contracted for technical advice and assistance during critical stages of the lift and relocation phases to support rescue and rehabilitation of oiled wildlife.

2.1.4 ACTIVITIES AT THE SHALLOW-WATER RECOVERY SITE

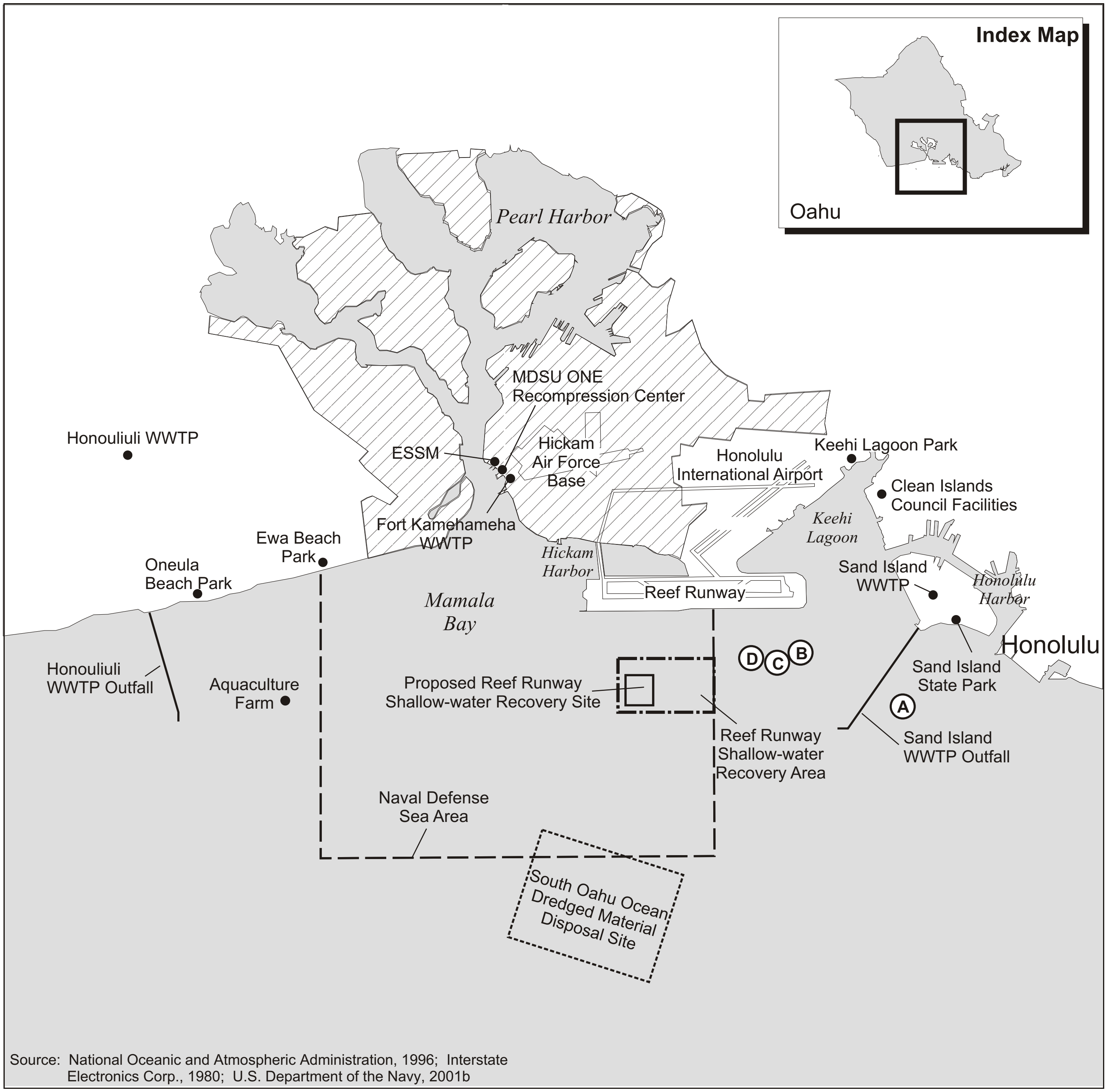
The results of a preliminary Location Assessment study (appendix D) narrowed the list of five potential shallow-water recovery sites to a single site. The Location Assessment compared the attributes of each candidate recovery site in order to support a ranking and decision concerning the preferred area to conduct shallow-water recovery operations.

Based on the scoring methodology detailed in appendix D, the Reef Runway site was clearly rated as the preferred site. The other four sites were not chosen because of safety or environmental concerns and are discussed further in section 2.2.3. The Reef Runway site would be selected from an area on the south coast of Oahu, roughly adjacent to the west end of Honolulu International Airport's Reef Runway (figure 2-9).

Field surveys were conducted at the Reef Runway shallow-water area to assess the seafloor conditions, such as gradients, bottom sediments, and marine habitat that would allow setting the hull down in a stable, upright position. The original field surveys were based on a preliminary four-point mooring plan that defined an anchor spread of approximately 1,000 by 1,000 feet (300 by 300 meters) and an operating depth of 72 to 100 feet (approximately 22 to 100 meters). The National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the State of Hawaii Department of Land and Natural Resources Aquatic Division, and U.S. Navy specialists collaborated and recommended a site adjustment to the west and seaward (figure 2-10) that would not adversely affect biological resources and would meet recovery operation requirements. Shortly following the initial site layout, significant modifications to the rigging plan and mooring plan deepened the bottom requirements to approximately 115 feet (35 meters) to embed the vessel hull and enhanced the mooring system to six points with an anchor spread of 1,750 by 2,100 feet (533 meters by 640 meters). The new requirements drove the analysis deeper (more southerly) and westerly where the seafloor slightly flattens as it approaches Pearl Harbor Channel. The diving support contractor proposed three potential mooring layouts that would meet mission requirements (figure 2-10). Again, the aforementioned state and federal agencies collaborated in selecting a preferred site, just inside the west boundary of the shallow-water recovery area. In addition, they worked closely with the diving contractor in modifying the mooring plan to avoid sensitive areas and in modifying the techniques that would be used for attachment. Based on this preliminary plan, the agencies surveyed the proposed vessel location and anchor points to confirm seafloor conditions. Details of the site conditions and the mooring plan are provided in appendix E.

Once at the shallow-water recovery site, *Ehime Maru* would be positioned generally parallel to the shoreline at a depth of approximately 115 feet (35 meters). An ROV would conduct a thorough survey of *Ehime Maru* to ensure that its hull rests solidly on the seafloor. To ensure diver safety, no dives would be attempted until the vessel has remained in a stable position for 24 hours. At that time, an external diver survey would be conducted, and the divers would assist *Rockwater 2* in detaching the lifting bar. The spreader assembly would remain suspended over *Ehime Maru*. *Rockwater 2* would then leave the area.

The diving support barge would then be moored as shown in figure 2-11. The mooring design would provide sufficient station keeping for conducting dive operations over *Ehime Maru* and to provide for precision positioning during the final lifting operation. The current design is based on information received from various sources regarding the environmental and bottom conditions at the shallow-water recovery site. Specifically, the environmental conditions (i.e., wind, seas, and current) are based on data compiled by the Naval Pacific Meteorology and Oceanography Center. Based on present information, the proposed shallow-water recovery site has been determined to be at 21 degrees 17 minutes 29.4



LEGEND

- Reef Runway Shallow-water Recovery Area
- Proposed Reef Runway Shallow-water Recovery Site
- Commercial Anchorages
- Naval Reservation

WWTP - Wastewater Treatment Plant
ESSM - Emergency Ship Salvage Material
MDSU ONE - Mobile Diving and Salvage Unit One

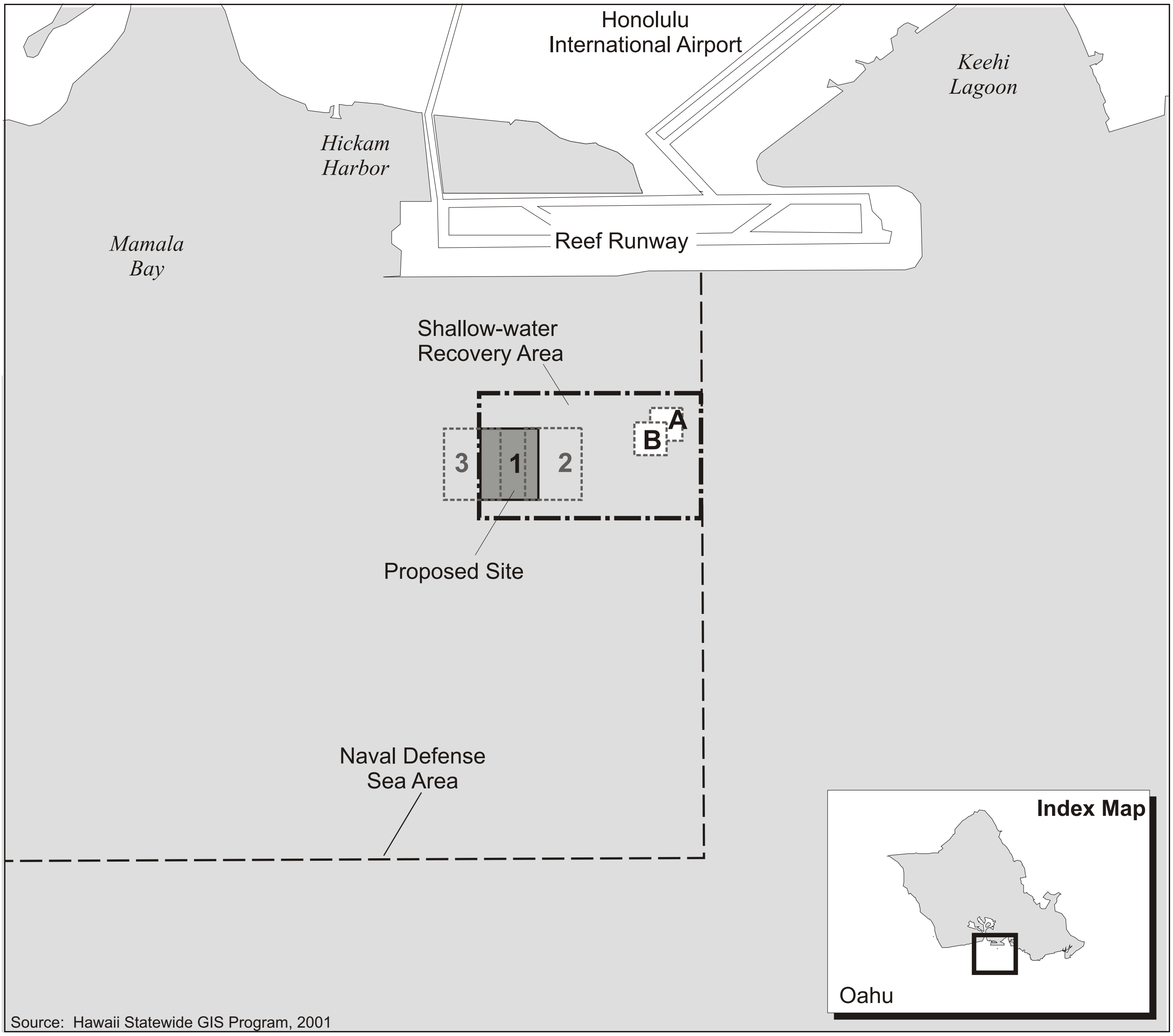
NORTH

No Scale

Reef Runway Shallow-water Recovery Area Vicinity Map

Figure 2-9

2_9VicinityMap060501



LEGEND

A/B Candidate Sites - Initial 1,000- by 1,000-foot (300- by 300-meter) sites based on 72 to 100 feet (22 to 30 meters) of sea water depth requirement and preliminary mooring plan

- A - Original Navy selected location
- B - Modified location based on input from State of Hawaii Department of Land and Natural Resources, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration (National Marine Fisheries Service)

1/2/3 Candidate Sites - 1,750- by 2,100-foot (533- by 640-meter) sites based on depth of 115 feet (35 meters) of sea water and modified mooring plan.

- 1 - Preferred site based on input from State of Hawaii Department of Land and Natural Resources, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration (National Marine Fisheries Services)
- 2 - Viable secondary site - meets mission and environmental criteria
- 3 - Excluded site did not meet mission requirements

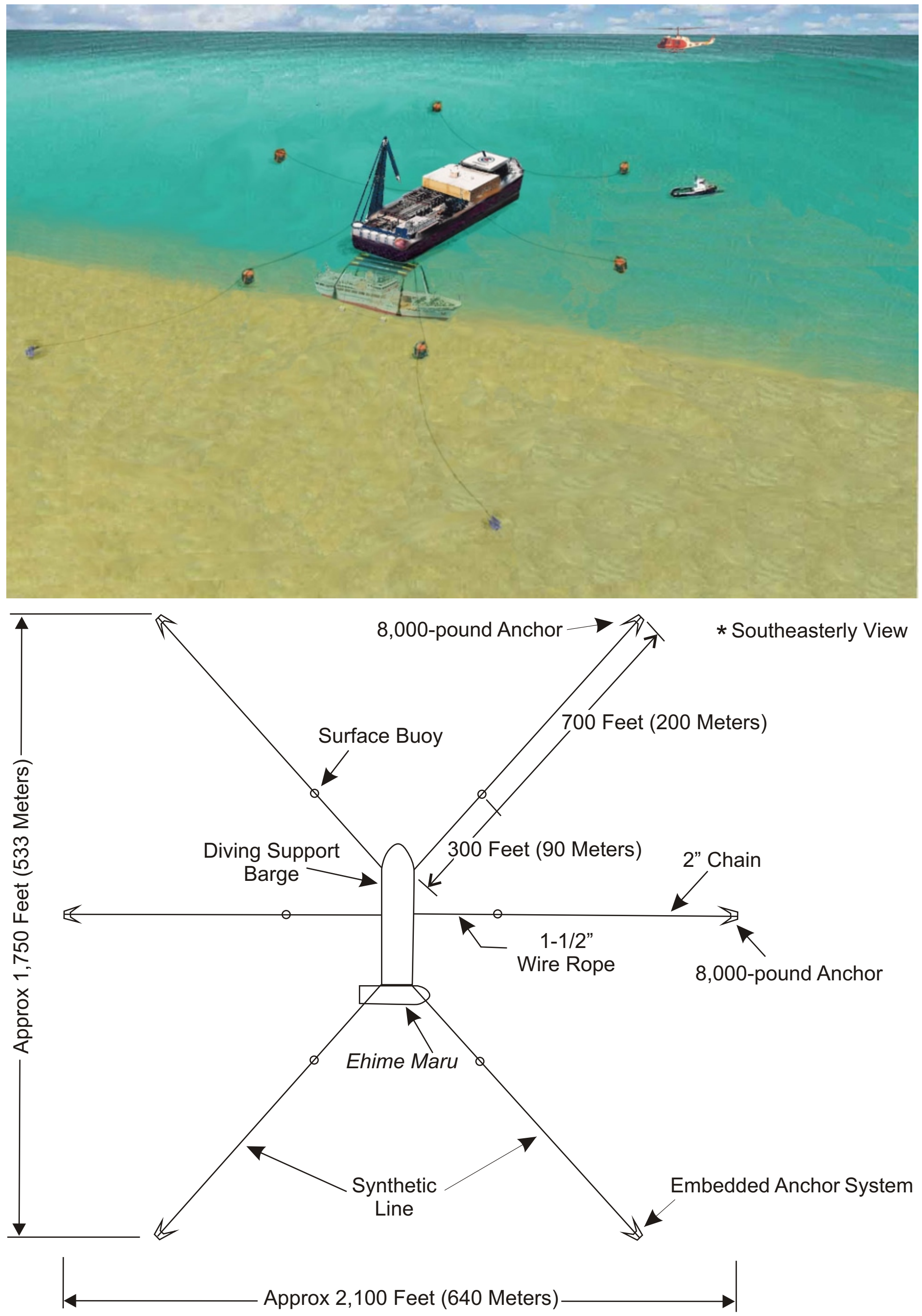
NORTH

No Scale

Reef Runway Shallow-water Recovery Area and Proposed Shallow-water Recovery Site

Figure 2-10

2_10RecoveryArea060501



Diving Support Barge and Mooring Plan Schematic

Figure 2-11

No Scale

seconds North latitude and 157 degrees 56 minutes 23.4 seconds West longitude. This location corresponds to a water depth of approximately 115 feet (35 meters). At this location, indications are that the bottom consists of a layer of sand and/or coral rubble volcanic rock substrate. The depth of unconsolidated material below *Ehime Maru* appears to be greater than 10 feet (3 meters) thick. The thickness of unconsolidated material varies greatly at the anchor points but should generally range from 6 feet (2 meters) to greater than 20 feet (6 meters) for the four anchor points emanating from the beam of the barge and bow into the deeper water. The two northern-most anchor points will consist of piles driven into a hard rock substrate. A detailed discussion of the proposed site selection and mooring plan can be found in appendix E.

The proposed plan would consist of a hybrid six-point mooring system in order to provide the needed position control during diving and lifting operations. This system would be a combination of traditional anchor arrangements and embedded anchor points. The final design and exact position of the embedded anchor points would be determined in part by core samples at the site.

Following the operation, in late October 2001, the driven piles would be cut off flush to the seafloor to restore the seafloor to pre-operation conditions.

Ehime Maru's flat bottom and low center of gravity would generally provide sufficient stability at the shallow-water recovery site. After *Ehime Maru* has remained stable for a total of 48 hours, the internal diving operation would begin. However, at any time that the vessel shifts, or otherwise exhibits any indication of instability, diving operations would cease until stability is corrected.

The Navy would request dedicated warning NOTMARs and NOTAMs for ships and aircraft, respectively, to avoid the recovery site.

2.1.4.1 Crewmember Recovery

At the shallow-water recovery site, divers from the U.S. Navy and Japanese divers from the U.S. Navy's Ship Repair Facility (SRF) in Yokosuka, Japan would perform a visual inspection and would conduct underwater video documentation of all ship spaces inspected. The U.S. Navy divers and the SRF Japanese divers would train and practice together before the recovery operation begins.

The SRF Japanese divers would play an integral part in the recovery operation by providing diving and topside support. While one SRF Japanese diver is in the water, another SRF diver would be at the communications console to help identify spaces through the diver's camera topside monitor.

The Japanese Maritime Self Defense Force (JMSDF) would also be invited to provide divers to observe crewmember recovery from the diving support barge. The JMSDF divers would not dive with the U.S. Navy and the SRF divers.

In accordance with *The U.S. Navy Diving Manual*, a minimum of eight divers would be required to operate a surface-supplied diving side using more than one diver. This operation would require two diving systems in use with a minimum of 16 divers per shift. Adequate numbers of divers, necessary to complete the mission in approximately 30 days, would be available for daylight diving during the recovery operation. Additional personnel would be required for decontamination, chamber surface-decompression, stage handling, topside camera systems, winch operations, and medical services. Although there would be no night diving, routine operations on the barge and preparation for the next day would require 24-hour activity during the diving operations.

The divers would attempt to recover crewmembers, personal effects, and other items uniquely characteristic to *Ehime Maru*. They would use underwater cutting tools and other tools as available to access as many compartments as can be entered safely. Diver safety would be of paramount importance, and all safety measures would be followed during recovery operations. Divers would inspect compressed compartments, but would not enter dangerous areas.

The Navy would establish a surface safety zone with a radius of 1 nautical mile (approximately 2 kilometers) around the recovery operations to ensure diver safety. Recovery activities could extend over 2 months. Communications integrity for the recovery operations may be maintained by establishing a temporary flight restriction area at and below 2,000 feet (approximately 610 meters) mean sea level within a radius of 1 nautical mile (approximately 2 kilometers) of the recovery activities. This temporary flight restriction would be issued and enforced by the FAA.

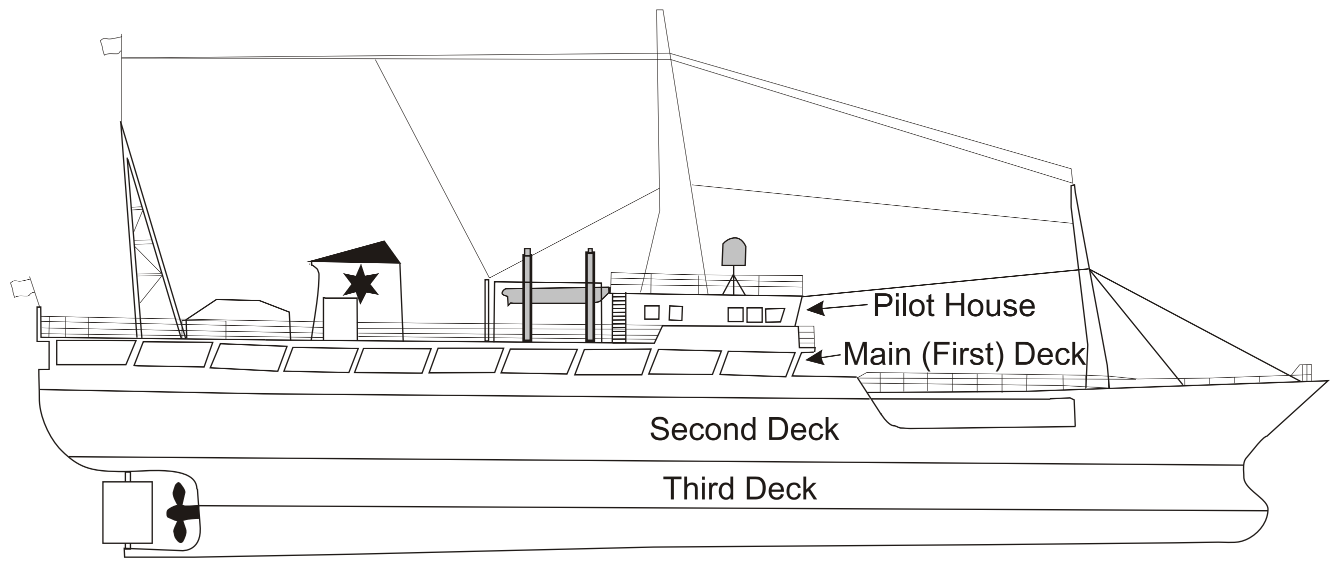
2.1.4.2 Entering, Inspecting, Recovering, and Documenting all Compartments

Entering

Divers would wear MK-21 surface supplied deep-sea gear with an emergency gas supply, which has a normal maximum working depth of 190 feet (58 meters). The divers would be supplied with air from the surface. Three divers would be used whenever entering the ship. A schematic of *Ehime Maru* is shown in figure 2-12. *Ehime Maru* consists of a 3rd deck, 2nd deck, main deck, pilothouse level, and observation deck. The 3rd deck is the deepest deck and has the engine room, student mess room, and refrigerator storeroom.

Inspecting, Recovering, and Documenting

The initial inspection would be conducted at the last reported location of the crewmembers. Any crewmembers and personal effects encountered would be collected and removed to the surface. If all crewmembers could not be recovered during this search, the divers would conduct an extensive search of every space, where safe entry can be achieved, documenting it on videotape. The entry to each space would be clearly marked and numbered. The diver would enter the space and perform a thorough search of the entire space. A helmet-mounted camera and light system would be connected to a video recorder and monitor on the diving barge. The Diving Supervisor, a Japanese diver, and Japanese officials would be able to observe the entire search through this monitor on the diving barge. The ship's drawing would be marked as the divers complete each inspection



Source: Shin Kurushima Dockyard Co., LTD. Engineering Division

Cross-section of *Ehime Maru* Deck Levels

Figure 2-12

No Scale

2_12EhimeMaruCross060101

to the satisfaction of the topside personnel. Operations would continue until all crewmembers have been found or all spaces have been thoroughly searched with video documentation, unless continued searches are deemed unsafe. U.S. Navy, State of Hawaii, or Japanese officials would take articles recovered, treat them, and maintain custody from the time the articles are brought to the surface by the divers.

Details of Support Platform to be Used

Naval Sea Systems Command would contract for a diving support barge. This barge would be used as a dive platform during the recovery and diesel fuel and lubricating oil removal phase and then used as the lift platform for relocation to the deep-water site. The 360-foot-long by 100-foot-wide (120-meter-long by 30-meter-wide) barge has power, water, galley, mooring gear, cranes, and living accommodations for 80 personnel. The barge also contains oily water/oily waste storage tanks to hold the residual diesel fuel and lubricating oil pumped from the *Ehime Maru*. The barge would be moored and supported with the assistance of a commercial tug contracted by Naval Sea Systems Command.

Type of Diving and Number of Chambers Required

Divers would be conducting operations that require decompression. Surface decompression is a technique that fulfills all of or a portion of a diver's decompression obligation in a recompression chamber instead of in the water, significantly reducing the time a diver must spend in the water. Also, breathing oxygen in the recompression chamber reduces the diver's total decompression time. Decompression would be conducted on the diving barge in a recompression chamber under controlled conditions. At least two chambers installed on the barge would be used for surface decompression with oxygen, and the chambers would also be used for the treatment of arterial gas embolism. Recompression chambers at MDSU-ONE would be used for treatment of decompression sickness.

Control of Oil Released During Crewmember Recovery Phase

During the crewmember recovery phase, the Navy would provide personnel for continuous monitoring from the diving support barge to monitor for leaking oil. One Navy skimmer system would be located on site for the initial survey period and retained as required. Booms would be deployed to contain any anticipated release of diesel fuel. Two additional Navy skimmer systems and *Clean Islands* would be on standby. Two Clean Islands Council helicopter dispersant bucket systems would also be on standby for immediate response in the unlikely event it should be necessary, and only if approved by the Coast Guard. CINCPACFLT would coordinate all unanticipated oil cleanup efforts with the U.S. Coast Guard and the State of Hawaii.

Timeline

The planned duration of the recovery operation is approximately 30 days. This includes video documentation, environmental remediation, and bad weather days. The length of this phase could be reduced if all crewmembers are found early and environmental remediation is not warranted based on the residual fuel on the ship. As mentioned in section 2.1.4, diving operations would not start inside the hull until *Ehime Maru* has remained stable for 48 hours after placement at the shallow-water recovery site. This initial time would be used to monitor vessel stability and perform external inspections of the vessel's condition. Upon the completion of the recovery operation and environmental remediation, the JMSDF divers would be invited to do a final closeout inspection.

2.1.4.3 Oil Disposition

The Navy would use all available resources to protect the environment from the release of diesel fuel and lubricating oil from *Ehime Maru* during the recovery operations. These measures would be appropriate given the high environmental sensitivity and economic importance of Hawaiian waters and shorelines and the unusually long lead-time allowed for planning the potential response. The Navy anticipates relatively minor oil release levels with minimal environmental impact during recovery operations, but would be prepared to contain and remove a larger release. Every effort would be taken to contain and clean up any release such that oil would be immediately contained and not impact the shoreline or aquatic resources.

Research into *Ehime Maru*'s diesel fuel and lubricating oil characteristics indicate that the remaining diesel fuel is non-persistent and would be expected to evaporate and naturally disperse more rapidly than heavier fuel oils. As noted, of the original 65,000 gallons (246,000 liters) on board, the maximum amount remaining after the collision is estimated at 45,000 gallons (170,000 liters). It also appears that approximately 1,200 gallons (4,500 liters) of the more persistent lubricating oil was on board at the time of the collision. The diesel fuel is relatively toxic to the marine environment and could irritate the skin of divers. However, the MK-21 diving gear would provide protection for the divers. The Navy, using booms and skimmers, would attempt to recover any releases of diesel fuel and lubricating oil to the maximum extent practicable before they reach the sensitive resources in Hawaii's nearshore waters. After consultation with the Coast Guard, alternative oil spill response technologies (elasticity modifiers, solidifiers) would only be considered as dictated by the Area Contingency Plan.

Most or all of the diesel fuel would have likely been released through ruptured tanks or open tank vents. The integrity of the fuel tanks was potentially compromised from the collision damage and the crushing effects of water pressure (62 atmospheres) on partially filled tanks as the vessel descended rapidly to 2,000 feet (600 meters). The recovery plan would seek to minimize the further release of diesel fuel and lubricating oil during recovery operations. Raising the vessel, transporting it to the shallow-water recovery site, and subsequent diving operations with *Ehime Maru* resting on the bottom in shallow water may result in continued "sheening" as very small amounts of residual diesel fuel and lubricating oil are released from the vessel and rise to the sea surface. Consequently, the risk of a significant diesel fuel and lubricating oil release is considered minimal. Nevertheless, the Navy would be prepared to respond to a maximum credible release of 45,000 gallons (170,000 liters) diesel fuel or an even greater release, with mechanical recovery and dispersant capability. However, sheening might not be eliminated entirely with booms and skimmers, and alternate actions may be warranted (such as sorbents, monitoring, and weathering actions). In the event of an unanticipated release, the Navy would work with the Coast Guard Captain of the Port, the State of Hawaii, and other federal, state, and local government agencies to amend the IAP in any way practicable to minimize environmental impacts. The recovery operation would maximize the use of available response resources.

The Navy's Recovery Commander would have the Naval Sea Systems Command offshore pollution response equipment on standby during the recovery operation in the event of an oil release. This equipment would include booms and skimmer systems. The Navy would also contract with the Clean Islands Council to ensure their presence and that their technical expertise and that adequate and appropriate equipment would be available for a release.

The Navy Recovery Team's established command structure for the recovery operation would include control of a maximum credible diesel fuel and lubricating oil release. The Unified Command, under the Incident Command System (ICS) (see figure F-1, appendix F) would be activated prior to critical operations to monitor for and coordinate a unified federal, state, and local response to an unanticipated diesel fuel and lubricating oil release. Only the unanticipated release of oil would require actions by the Unified Command in accordance with the approved IAP. The IAP (appendix F) has been fully coordinated and approved by members of the Unified Command.

The Unified Command would use the Incident Command Post facilities on Sand Island Access Road in Honolulu, Hawaii during the lift and relocation activities. The Unified Command in this instance would consist of the federal OSC, the state OSC, and the CINCPACFLT Deputy Chief of Staff for Maintenance as the Incident Commander. A representative of the Japanese government would be invited to observe the operation with the ICS team.

The Navy, considering diver safety first, would remove to the maximum extent practicable the remaining fuel once the vessel is placed on the seafloor at the shallow-water recovery site. Removal of fuel at 2,000 feet (600 meters) is not possible, as current technology is limited to a maximum depth of less than 1,000 feet (300 meters). Fuel removal would also be further complicated unless the tanks were relatively undamaged, whereas those on *Ehime Maru* have been exposed to 2,000 feet (600 meters) of water pressure, or approximately 62 atmospheres. Removal of the fuel while suspended under *Rockwater 2* would be unsafe, because it would require working on the vessel while it was under strain and in a seaway. Once the vessel is placed in the shallow-water recovery site, a risk versus gain assessment considering risks to divers and the environment would be conducted for fuel removal. Should persistent fuel leakage occur, divers would tap into the tanks through their tops and sides, or other methods of removal would be attempted, where feasible and appropriate.

Oil and hazardous materials possible on this type of vessel include diesel fuel, lubricating oil, freon, and minimal quantities of paint and solvents located topside. There were no polychlorinated biphenyls (PCBs), ammonia, or asbestos on board *Ehime Maru*. The Navy would ensure appropriate disposal of the oil removed. During the removal actions, the U.S. Environmental Protection Agency and the U.S. Coast Guard would be invited to monitor the Navy's certification that the vessel is prepared for relocation to the deep-water site.

A vessel decontamination area would be established at the ESSM facility located on Hickam Air Force Base, Hawaii, or other appropriate location. The hulls of any contaminated vessel would be wiped with “hand cleaner” to remove any oily film, if necessary. Because an oil boom must be cleaned before returning it to inventory, a boom cleaning station would also be established at the ESSM facility, or other appropriate location.

2.1.5 RELOCATION TO A DEEP-WATER SITE

Once the dive team completes shallow-water recovery operations, *Ehime Maru* would be lifted back off the seafloor and taken to a deep-water site with a depth greater than 1,000 fathoms (6,000 feet or 1,800 meters). The deep-water relocation site (see figure 2-13) under consideration is located in an area just beyond the 1,000-fathom contour and outside the limit of the U.S. territorial waters. The barge that supports the diving operations would be used to make the lift and take *Ehime Maru* to the deep-water relocation site. Steps required in this phase are discussed in the following sections.

2.1.5.1 Preparation for Relocation

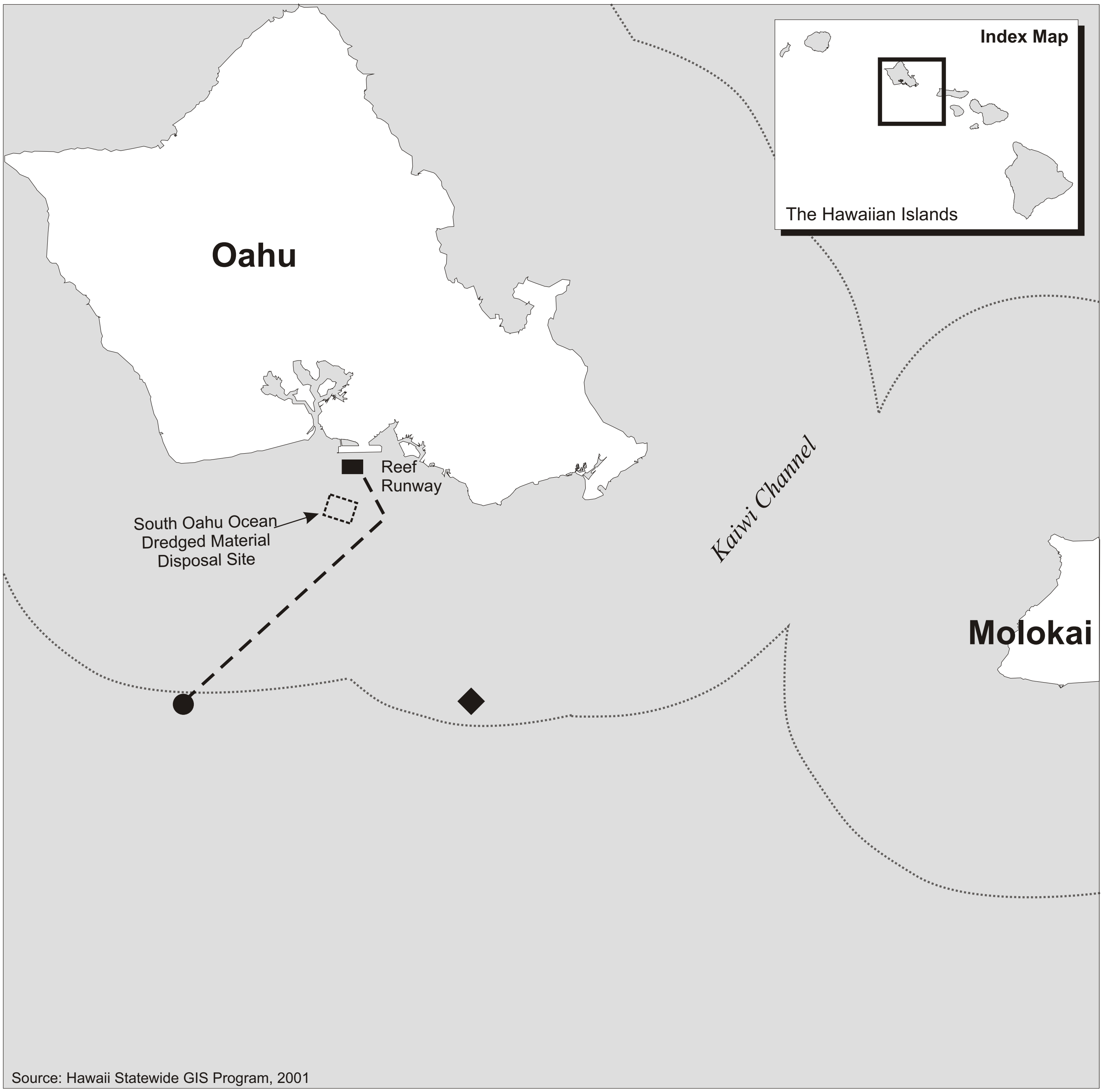
The initial task in this phase would be the completion of the removal of the diesel fuel and lubricating oil from *Ehime Maru* in preparation for relocation to the deep-water site. The Navy would remove, to the maximum extent practicable, all known hazardous materials that may degrade the marine environment and that are not an integral part of *Ehime Maru* or the components of *Ehime Maru* before vessel relocation. Once crewmembers, personal effects, cargo nets, fish hooks and long lines, and diesel fuel and lubricating oil have been removed, divers would secure all doors and hatches in an effort to minimize the release of floatable debris during relocation to the deep-water site. The Navy would document all known hazardous material not removed from the vessel.

2.1.5.2 Method for Reattachment

The recovery barge would settle (ballast) down approximately 15 feet (5 meters) while moored directly over *Ehime Maru*. Divers would then assist in rigging lift chains from the barge to the spreader assembly and secured to the lifting plates under *Ehime Maru*. A final inspection would ensure that all rigging is still in place (figure 2-14).

2.1.5.3 Lift from Seafloor

Once divers are clear of the water and conditions are acceptable, the slack would be taken out of the lifting chains using deck winches. Once all slack is out of the chains, the barge would be deballasted to lift *Ehime Maru* clear of the seafloor for transit to deep water.



LEGEND

◆ Current Location

■ Shallow-water Recovery Area

● Deep-water Relocation Site

– – – Transit Route

.... U.S. Territorial Waters

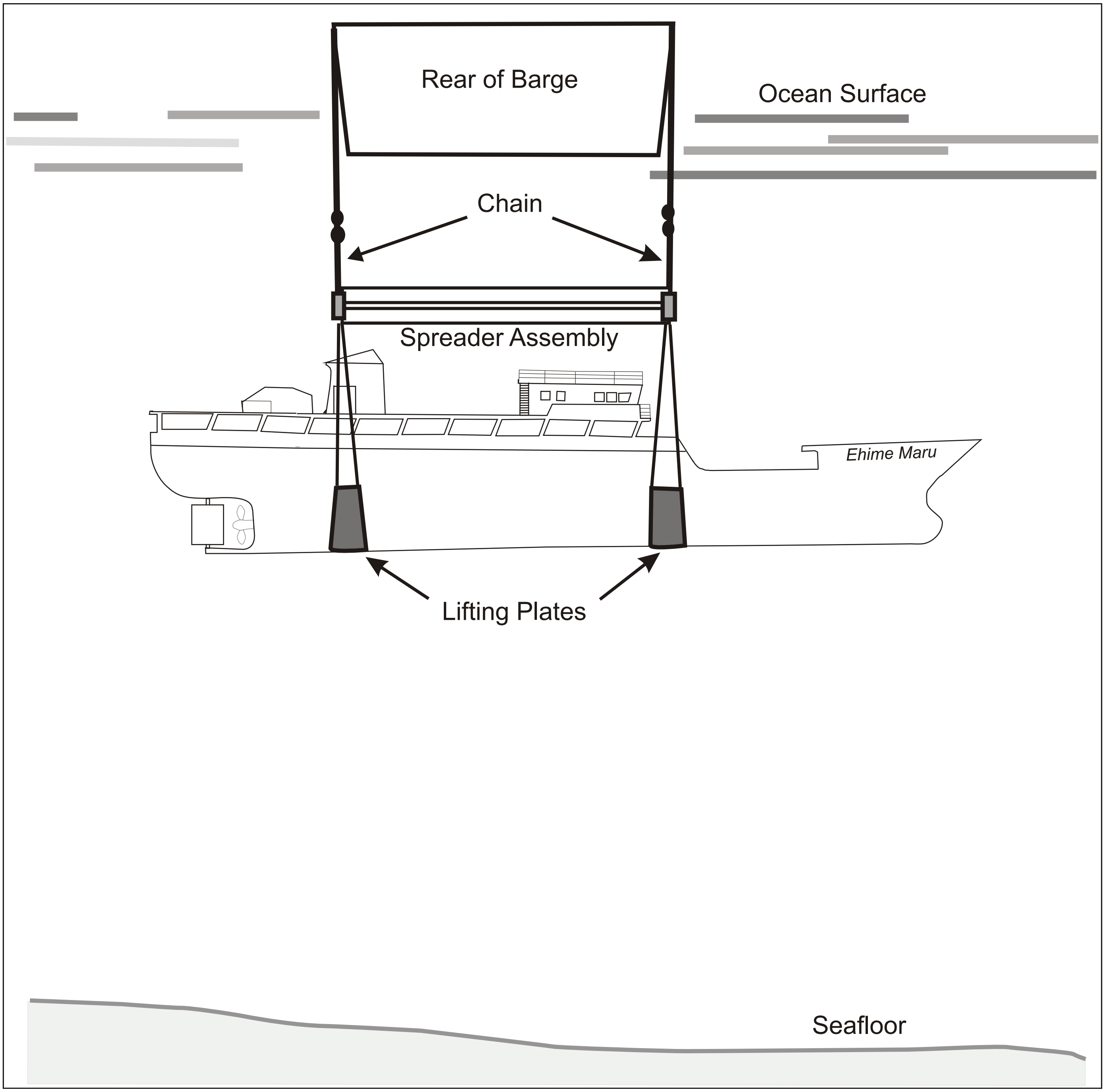
NORTH

No Scale

Deep-water Relocation Site

Figure 2-13

2_13DeepWater060101



Ehime Maru
Suspended Below Diving Support Barge

Figure 2-14

No Scale

2_14RecoveryBarge060101

2.1.5.4 Transit to the Relocation Site

Two tugs would be used to tow the barge and *Ehime Maru* to the selected deep-water relocation site following a previously surveyed route. One tug would tow, while the other would be connected to the stern of the barge to maintain constant drag for control. A maximum speed of 1 knot (approximately 2 kilometers per hour) would be maintained. The transit route would avoid crossing over the South Oahu Ocean Dredged Material Disposal Site.

After *Ehime Maru* has been lifted from the seafloor and has started its transit to the relocation site, divers would again survey the shallow-water relocation site to ensure all materials have been removed from the site. JMSDF divers would be invited to inspect the seafloor for any remaining objects. Additionally, an ROV would videotape the shallow-water recovery area after removal of all equipment and debris. No debris would remain after the recovery operation is completed.

A temporary flight restriction and a Coast Guard surface safety zone would be established with a 1-nautical-mile (approximately 2-kilometer) radius on each side of the transit route. The temporary flight restriction would be up to an altitude of 2,000 feet (approximately 610 meters). This temporary flight restriction would be issued and enforced by the FAA. The Navy would request the dedicated warning NOTMARs and NOTAMs for ships and aircraft, respectively, to avoid the transit route. The Coast Guard would establish and enforce the surface safety zone outside the Naval Defense Sea Area as required to keep other vessels clear of the area.

2.1.5.5 Relocation at the Deep-water Site

Once at the deep-water relocation site, the temporary flight restriction and Coast Guard surface safety zone would be expanded to an area with a radius of 3 nautical miles (approximately 6 kilometers). The temporary flight restriction, up to an altitude of 2,000 feet (approximately 610 meters), would be issued and enforced by the FAA, and the Coast Guard would establish and enforce the surface safety zone. Both the temporary flight restriction and the surface safety zone would be published in NOTAMs and NOTMARs. During the transit and relocation activities, the Navy would provide periodic surveillance overflights to monitor for any release of oil or floatable debris on the surface. A Navy skimmer system would be retained on standby throughout the process. Although not anticipated to be required, two helicopter dispersant bucket systems would be on standby in Honolulu, and would be used only with the approval of the federal OSC. Following the relocation operation, the barge would be towed back to Pearl Harbor to demobilize the dive system and personnel, completing the operation.

Following arrival at the deep-water relocation site, the towing gear would be removed. Divers would then position either mechanical, explosive, or thermal release devices below the lifting bar. *Ehime Maru* would then be released from the lifting bar. The lifting bar would be retrieved and placed aboard the barge.

The proposed deep-water relocation site is anticipated to be at 21 degrees 05 minutes North latitude, 158 degrees 07 minutes West longitude. *Ehime Maru* would be equipped with a 30-day pinger to assist in determining its final location on the seafloor. The pinger would be identical to the equipment used on flight recorders for commercial and military aircraft. Table 2-1 lists the specifications of the pinger.

Table 2-1: Pinger Specifications

Manufacturer	Dukane
Frequency	37.5 kHz
Output	160.5 decibel sound pressure level re 1 micropascal at 1 meter RMS (163.5 peak)
Actuation	Water (fresh or salt)
Radiation Pattern	Rated output over 80 percent of sphere
Size	1.3-inch (33-millimeter) diameter and 3.92 inches (10 centimeters) long
Operating Depth	Surface to 20,000 feet (6,000 meters)
Pulse Length	Not less than 9 milliseconds
Operating Life	30 days

Source: Naval Sea Systems Command, 2001c

2.2 ALTERNATIVES CONSIDERED BUT DETERMINED NOT FEASIBLE

Several alternative recovery procedures and locations were considered and rejected as not reasonable alternatives. They are discussed in the following sections.

2.2.1 RECOVERY IN PLACE AT DEEP-WATER LOCATION

Three alternatives were considered for recovering crewmembers and personal effects at the approximately 2,000-foot (600-meter) depth. The first option considered was the use of an ROV to enter the hull and search for crewmembers and recover personal effects. This option was deemed not feasible once the vessel was located. Based on the visible damage to the exterior hull and probable damage to the stern from the penetration of USS *Greeneville*'s rudder, it would be reasonable to assume that bulkheads and piping on the interior also suffered damage. Without clear definition of where to locate crewmembers, a full search of all compartments would be necessary, but a precision method of cutting to provide access to the interior of the vessel at that depth does not currently exist. Recovery would be further impeded by the likelihood that the damaged vessel could damage the ROV's umbilical and thus jeopardize the success of the mission equipment.

Secondly, the Navy considered using saturation divers for deep-water recovery. However, available saturation systems do not provide adequate capability at 2,000 feet (600 meters).

The third discarded option involved lifting *Ehime Maru* as high as possible below the *Rockwater 2* and using divers to recover crewmembers and personal effects while suspended. However, recovery from a vessel suspended in the open ocean would be too dangerous. Naval Sea Systems Command determined that this option would be extremely hazardous and could result in loss of divers' lives. Because of this potential loss of life and the early search and condition evaluations, the Navy concluded that the recovery operation should not be attempted while *Ehime Maru* is suspended in deep water.

2.2.2 RECOVERY OUT OF WATER

The Navy considered removing *Ehime Maru* from the water by placing its hull on a submersible barge or heavy lift ship such as *M/V Blue Marlin*. However, the maximum depth at which these vessels can ballast down is approximately 30 feet (10 meters). Because the keel of *Ehime Maru* when suspended would be approximately 115 feet (35 meters) below the surface, use of a submersible barge or heavy lift ship is not possible.

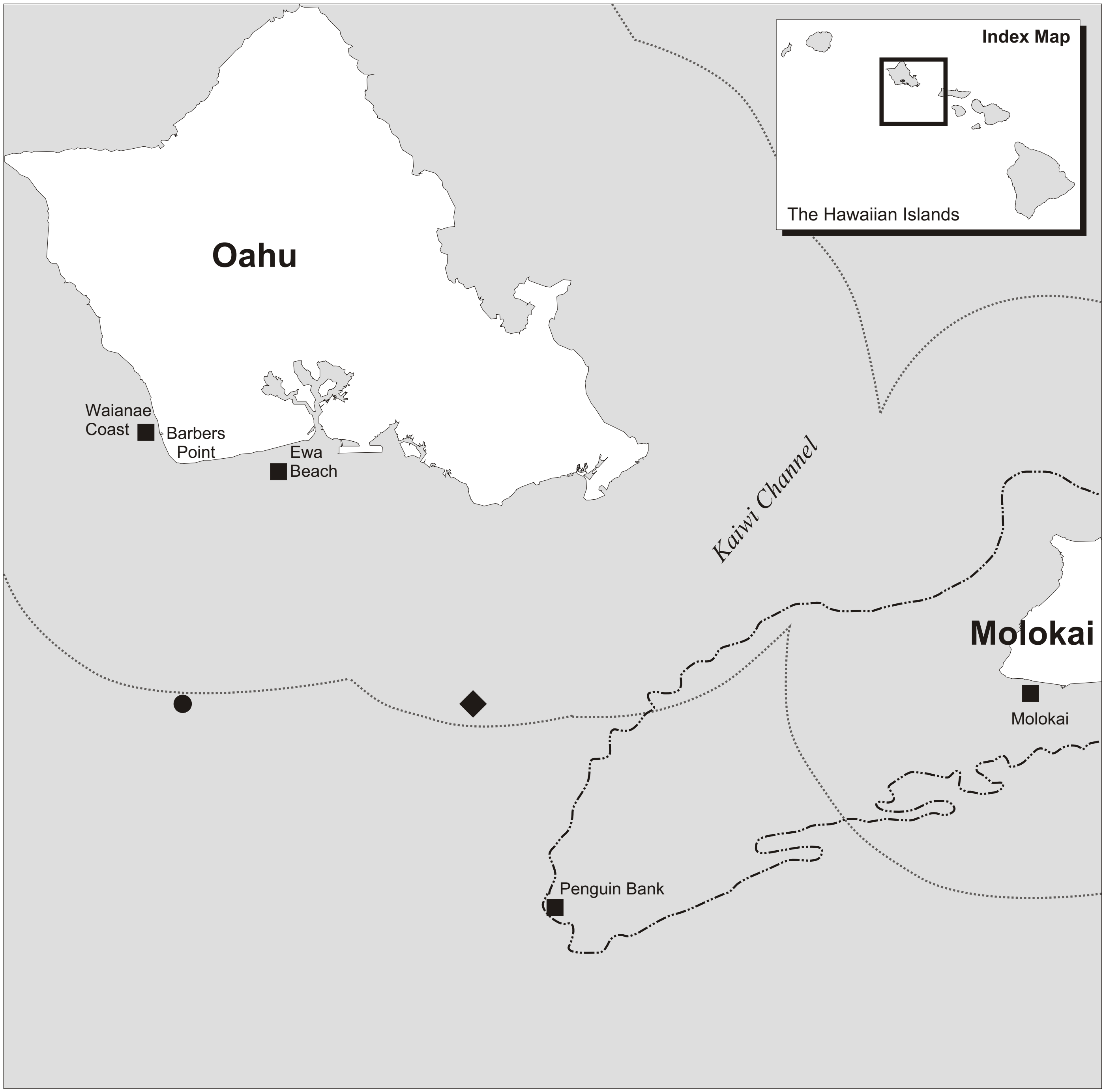
Another out-of-water option would be to attempt to transfer the load from the lifting ship to a fixed crane, then place it on a transport barge for recovery while offshore. Although this option is technically feasible, it could only be done under ideal weather conditions. Even if excellent weather conditions prevail, this option still presents an unacceptable risk of loss of the vessel, damage to equipment, or injury to personnel, as well as a much higher risk of an oil release.

The option of heavy lifting *Ehime Maru* to the surface by way of a spreader assembly while still rigged was analyzed. Under this scenario, the vessel would be lifted, positioned on a barge, taken to Pearl Harbor, and off-loaded on land for crewmember recovery. This option had severe structural and stability issues, especially when breaking the sea/air interface. This option would also increase environmental hazards caused by any residual oil release beyond an acceptable risk.

2.2.3 RECOVERY AT OTHER SHALLOW-WATER SITES

Figure 2-15 shows the four shallow-water recovery sites considered in the Location Assessment (appendix D) and determined not feasible. Of these four sites, Penguin Bank and southwest Molokai were eliminated following the Location Assessment study because of their overall poor performance in meeting stated program goals and objectives. The Ewa Beach and Waianae Coast sites exhibited many favorable characteristics, but were later determined to have environmental concerns that would prevent meeting mission criteria for diver safety. A brief summary of the issues surrounding the four sites is provided below.

Both Penguin Bank and the southwest Molokai sites are within the Hawaiian Islands Humpback Whale National Marine Sanctuary. In addition, the Penguin Bank seafloor was below the preferred depth for recovery operations. It is also situated in the open channel,



LEGEND

- ■ Candidate Shallow-water Recovery Sites
- ◆ Current Location
- ● Deep-water Relocation Site (Beyond the 1,000-fathom contour)
- –·–·– Penguin Bank
- ·········· U.S. Territorial Waters (12 Nautical Miles)

NORTH

No Scale

Shallow-water Sites Deemed Not Feasible for Recovery Operations

Figure 2-15

2_16NotFeasibleSites060101

an area of extremely volatile sea state. Southwest Molokai was also considered unsuitable because of the dangerously shallow transit route the vessel would have to traverse across Penguin Bank, its relatively pristine environmental setting, and the difficulty of providing support and emergency services for a moderately long-term operation.

The Waianae Coast site is about 1 nautical mile (2 kilometers) northwest of Barbers Point, and Ewa Beach is approximately 2 nautical miles (4 kilometers) west-southwest of the entrance to Pearl Harbor, Oahu. Both of these sites were subjected to additional detailed bathymetric mapping, subsurface video surveys, and agency consultation in order to increase the fidelity of the data. Both sites rated well for seafloor conditions, enforceable airspace, and moderately favorable sea states, but were rated down for their proximity to high use public beaches and recreation areas. Surveys at both sites also indicated the presence of resting green sea turtles and critical habitat. Additional information on these sites is presented in appendix L.

2.3 RECOVERY-NOT-POSSIBLE ALTERNATIVE

If the Recovery-not-possible Alternative is chosen, *Ehime Maru* would not be recovered and would remain at its current location in its present condition. This alternative would not allow for the recovery of *Ehime Maru* crewmembers, personal effects, and certain characteristic components, or for the removal of diesel fuel and lubricating oil. The deck would not be cleared of cargo nets, fishing hooks and long lines, rafts, rigging on the masts, and any other obstacles that could cause a future impact to the marine environment.

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3.0
AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

The following sections succinctly describe the existing environment of the areas that could be affected by the Proposed Action and the Recovery-not-possible Alternative under consideration. The descriptions provide relevant information for those unfamiliar with the environmental setting. In addition, they provide the context for understanding the environmental analysis and conclusions discussed in chapter 4.0. Lastly, they provide the environmental baseline against which impacts of the alternatives can be compared. Emphasis is placed on those features or components of the affected environment that could be impacted, and on identifying the particular vulnerabilities of these environmental components.

The criteria for inclusion or exclusion of particular environmental components and their attributes are whether the Proposed Action and the Recovery-not-possible Alternative could potentially impact, directly or indirectly, that environmental component and its attributes. Using these criteria, the following components are studied in detail: water quality; marine biological resources, including coral reefs; health and safety; hazardous materials and hazardous wastes; and airspace use. These components are addressed in the following sections. The geographical area that could potentially be affected by the Proposed Action and the Recovery-not-possible Alternative, referred to as the region of influence (ROI), varies depending on the environmental resource. The data and information presented is commensurate with the importance of the potential impact.

Hawaiian Islands Marine Environment Background Information

Natural hazards are a fact of life on Hawaii's coasts. Hazards that specifically impact coastal areas and that may be encountered during implementation of the Proposed Action include storm surges and seasonal high waves. Winds, currents (particularly regional currents), tides, and seas (surface waves) also add to hazards in the waters off Oahu. Winds, currents, tides, and seas are all critical features of the marine environment and are discussed briefly below.

High Winds and Storm Surge

Tropical cyclones periodically threaten the Hawaiian Islands. Such storms generate high winds and waves, heavy rains, marine storm surge, tornadoes, waterspouts, and small-scale, intense winds. Storm effects can be considerable even when a hurricane does not pass directly over an island. Unfortunately, the factors that influence the severity of storm-surge flooding (such as coastal topography, tidal stage and height at the time of the storm, and location relative to the eye of the hurricane) cannot be predicted more than a few days in advance. (Juvik and Juvik, eds, 1998)

Seasonal High Waves

Sudden high waves and the strong currents they generate are probably the most consistent and predictable coastal hazards in Hawaii. High surf is a condition of dangerous waves 10 to 20 feet (3 to 6 meters) high or more. On Oahu's southern coast, high surf usually forms during summer, when storms in the southern hemisphere generate waves of 4 to 10 feet (1 to 3 meters). Sets of large waves can develop suddenly, often doubling in size within a few seconds. The coastal water level increases under these conditions, and the seaward surge of excess water generates extremely dangerous rip currents. (Juvik and Juvik, eds, 1998)

Regional Currents

The Hawaiian Islands affect the waters around the islands by interactions with large-scale ocean currents and wind speed variations in the lee of the islands. On the southern boundary of Oahu, for example, trade winds with speeds of 22 to 44 miles per hour (10 to 20 meters per second) are separated from the calmer lee by a narrow boundary area (wind shear line). Variations in winds have subtle effects on current patterns. Clockwise eddies can form under the southern shear lines. Off the southern coast of Oahu, surface currents average about 0.33 feet per second (10 centimeters per second), but can vary by as much as a 1 foot per second (30 centimeters per second) (Juvik and Juvik, eds, 1998).

Tides

Local underwater surface contours affect the ranges and phases of tides along the shore as the tidal cycles wrap around the Hawaiian Islands. Tidal currents result from tidal variations in sea level, and near shore they are often stronger than the large-scale offshore flow. The semi-daily and daily tidal currents tend to be aligned with the shoreline off Oahu. However, due to the variability of tidal currents around the island and other factors, they cannot be predicted as precisely as the general sea level. Strong swirls often result from tidal currents flowing around points, such as Barbers Point, and headlands and can be hazardous to divers. (Juvik and Juvik, eds, 1998)

Surface Waves

Offshore of Oahu the seas are moderately rough, with wave heights of 3 to 14 feet (1 to 4 meters). These vary seasonally with trade wind intensity. Between the islands, where the winds are funneled, the seas are intensified. The lee, shielded from the winds, is generally calmer. Along the shores waves become steeper and break as they enter the shallow water. The south shores of the Hawaiian Islands, shielded from northwesterly swells, are usually calm in winter. During the summer, swells are commonly 3 to 9 feet (1 to 3 meters) high. Breaking waves move water toward the shore, where it escapes along shore. The water then returns to sea as narrow rip currents generally located where the bottom is deepest. Although forecasts about general wave conditions can be made, the size or timing of individual waves cannot be predicted. (Juvik and Juvik, eds, 1998)

3.1 WATER QUALITY

Region of Influence

The ROI for water quality is defined as the area potentially affected by the activities necessary to implement the Proposed Action. For the purposes of this document it is the water immediately around *Ehime Maru*, an elliptical cone-shaped column of water from the ship to the sea surface, that would be the pathway for any petroleum product releases, and the sea surface area indicated on the plume model figures in appendix H.

Marine Environment

The general composition of the ocean includes water, sodium chloride, dissolved gases, minerals, and nutrients. These characteristics determine and direct the interactions between the sea water and its inhabitants. Table 3-1 lists the general mineral composition of sea water. Appendix I, part 1, presents a more detailed list of elements and their behavior in sea water. The most important physical and chemical properties are temperature, salinity, density, pH, and dissolved gases.

Table 3-1: General Mineral Composition of Sea Water

Constituent	Concentration (in parts per million)	Constituent	Concentration (in parts per million)
Chloride	18,980	Lead	.004–.005
Sodium	10,560	Selenium	.004
Sulfate	2,560	Arsenic	.003–.024
Magnesium	1,272	Copper	.001–.09
Calcium	400	Tin	.003
Potassium	380	Iron	.002–.02
Bicarbonate	142	Cesium	~ .002
Bromide	65	Manganese	.001–.01
Strontium	13	Phosphorus	.001–.01
Boron	4.6	Thorium	= < .0005
Fluoride	1.4	Mercury	.0003
Rubidium	.2	Uranium	.00015–.0016
Aluminum	.16–1.9	Cobalt	.0001
Lithium	.1	Nickel	.0001–.0005
Barium	.05		
Iodide	.05		
Silicate	.04–8.6		
Nitrogen	.03–.9		
Zinc	.005–.014		

Source: U.S. Geological Survey, no date.

Temperature

Water temperature is one of the most important physical factors of the marine environment. Temperature controls the rate at which chemical reactions and biological processes occur (Waller, 1996). In addition, most organisms have a distinct range of temperatures in which they may thrive. A greater number of species live within the moderate temperature zones, with fewer species tolerant to extremes in temperature. Typically, the vast majority of organisms cannot survive dramatic temperature fluctuations.

Temperature gradients are created when warmer, lighter water floats above colder, denser water. A thin, narrow band of stable water called a thermocline separates the warm and cold layers of water. In tropical latitudes, the thermocline is present as a permanent feature and is located 200 to 1,000 feet (approximately 60 to 300 meters) below the surface. The thermocline acts as a depth barrier to many plants and animals and often represents the boundary between hospitable and inhospitable water masses for many species of organisms. (Waller, 1996)

Salinity

Salinity refers to the salt (sodium chloride) content of sea water. For oceanic waters, the salinity is approximately 35 parts of salt per 1,000 parts of sea water. Variations in the salinity of ocean water are linked primarily to climatic conditions. Salinity variations are at their highest at the surface of the water. The salinity of surface water is increased by the removal of water through evaporation. Alternately, salinity decreases through dilution from the addition of fresh water (e.g., rain, runoff from fresh water sources such as streams). Estuaries and coastal areas represent transition zones from saltwater to fresh water. Sea water salinity has a profound effect on the concentration of salts in the tissues and body fluids of organisms. Slight shifts of salt concentrations in the bodies of animals can have stressful or even fatal consequences. Therefore, animals have either evolved mechanisms to control body salt levels, or they let them rise and fall with the levels of the sea water around them. (Waller, 1996)

In addition to the direct effects on marine biota, salinity also has an effect on the ocean’s physical properties. For example, salinity helps maintain a constant temperature throughout the ocean depths. A high salt content in water slightly increases its density, which makes it resistant to drastic temperature fluctuations.

Density

Density (mass per unit volume) of sea water is dependent upon its composition and is affected by temperature. The dissolved salt and other dissolved substances contribute to the higher density of sea water versus fresh water. As temperatures increase, density decreases. Accordingly, water that is more dense will sink, while water that is less dense will rise. Therefore, oceans can be thought of as having a three-layered system of water masses. The three layers of the ocean are the surface layer (0 to 550 feet [0 to 168 meters]), an intermediate layer (550 to 1,500 feet [168 to 457 meters]), and a deep-water layer (1,500 feet [457 meters] to the seafloor). (Waller, 1996) *pH*

The measure of the acidity or alkalinity of a substance, known as the pH, is based on a scale ranging from 1 (highly acidic) to 14 (highly basic). A pH of 7 is considered neutral. Surface sea water often has a pH between 8.1 and 8.3 (slightly basic), but in deeper water the acidity of ocean water is very stable with a neutral pH. In shallow seas and coastal areas, the pH can be altered by plant and animal activities, pollution, and interaction with fresh water. (Waller, 1996)

Dissolved Gases

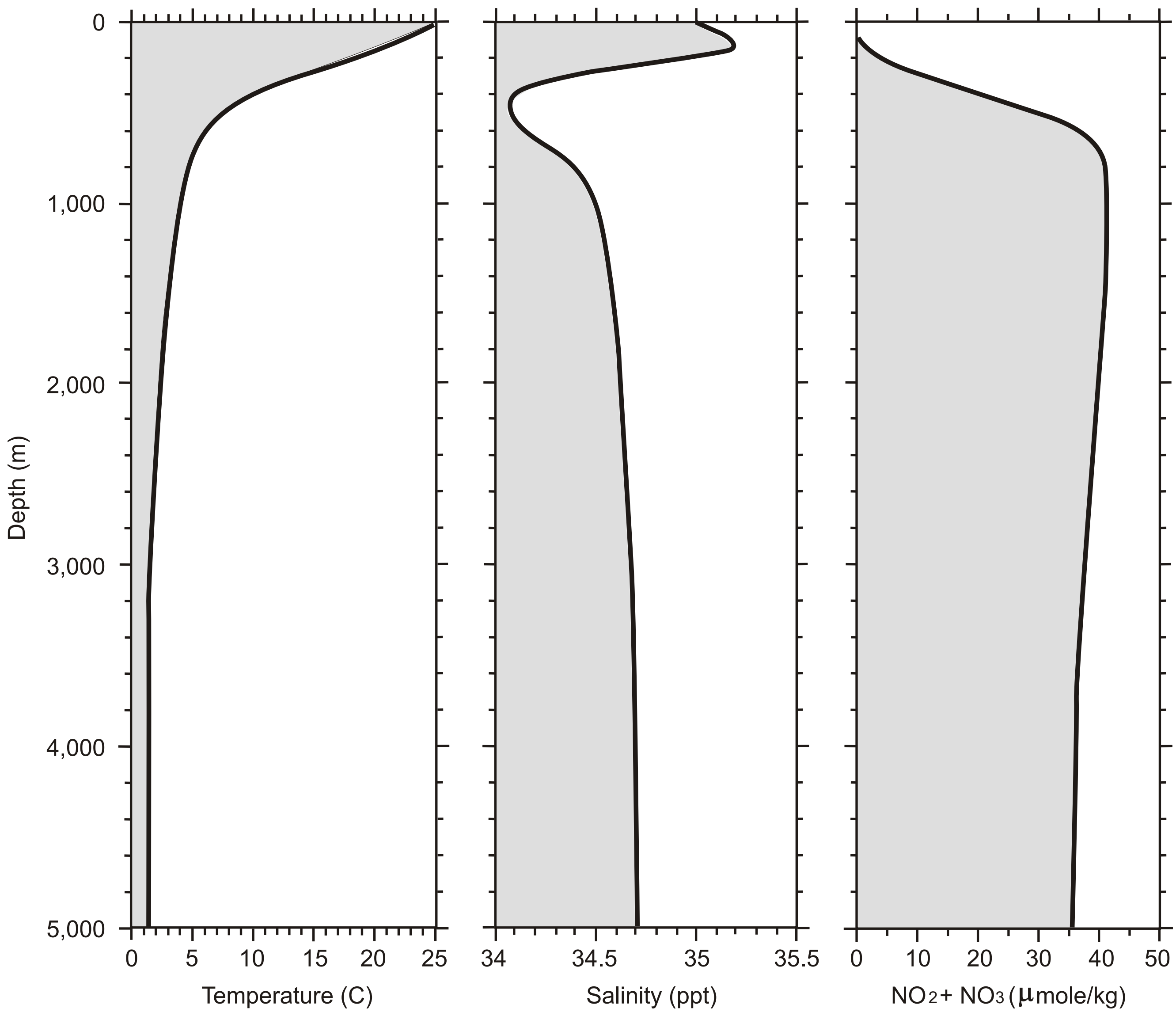
Oxygen is not readily soluble in sea water. The amount of oxygen present in sea water will vary with the rate of production by plants, consumption by animals and plants, bacterial decomposition, and by surface interactions with the atmosphere. Most organisms require oxygen for their life processes. When surface water sinks to deeper levels, it retains its store of oxygen. (Waller, 1996)

Carbon dioxide is a gas required by plants for photosynthetic production of new organic matter. Carbon dioxide is 60 times more concentrated in sea water than it is in the atmosphere. Sea water in tropical regions has lower levels of all dissolved gases in a given volume of water compared to sea water in high latitude areas (Waller, 1996).

Figure 3-1 depicts the average vertical profiles of temperature, salinity, and major nutrients computed from a series of monthly surface-to-bottom measurements made between 1988 and 1995 at Ocean Station Aloha located north of Oahu. Essentially the same conditions would be expected south of Oahu. Near the surface, the water column is mixed by wind and has uniform properties; the depth of the turbulent layer varies from nearly 400 feet (120 meters) in winter to less than 100 feet (30 meters) in summer. Below the mixed layer there is a sharp decrease in temperature (a thermocline), from 77 degrees Fahrenheit (F) (25 degrees Celsius [C]) at the surface to 41 degrees F (5 degrees C) at 2,300 feet (700 meters) depth, then a gradual decrease to 36 degrees F (1.5 degrees C) at the bottom. The salinity distribution reflects the sinking of water from the north: higher salinity water of 35.2 parts per thousand (ppt) at 500 feet (150 meters) depth, traceable to the high surface salinity water north of Hawaii; and low salinity water of 34.1 ppt at 1,670 feet (500 meters) depth, traceable to low surface salinity water further to the northwest. Below this depth, salinity increases gradually to 34.7 ppt for abyssal waters. The concentration of nutrients is small at the surface, but increases steadily to the bottom. Similar vertical distributions are found for phosphate and silicate. (Flament, et al., 1996)

3.1.1 CURRENT LOCATION

Because of its depth, the quality of sea water at the current location is expected to be relatively high. Chemical water quality data are not available for the ship's current location; however, data were available for sea water quality at a dredged material disposal site located near the shallow-water recovery site. Major components of sea water



Source: University of Hawaii, no date

LEGEND

C - Celcius
ppt - Parts per thousand
NO_2 - Nitrite
NO_3 - Nitrate
m - Meters

Average Vertical Distribution of Temperature, Salinity, and Major Nutrients in Hawaiian Waters

Figure 3-1

include particulate organic mater (plant detritus), particulate inorganic material (minerals), gases, organic and inorganic colloids, and dissolved organic and inorganic solutes (Millero and Sohn, 1992). Table 3-1 lists the general mineral composition of sea water.

Prior studies of the water chemistry in the ocean south of Oahu show the region is more oceanic than coastal in character. From September 1976 to April 1977, dissolved oxygen concentrations in the surface waters in this area were supersaturated, increased slightly between depths of 75 and 300 feet (25 and 100 meters), and gradually decreased with depth. Most dissolved oxygen values in this area remain above 4 milliliters/liter. Characteristic oxygen profiles for the Pacific Ocean show surface oxygen concentrations ranging from approximately 5 milliliters/liter to a minimum of less than 1 milliliter/liter between depths of 450 and 1,200 feet (150 and 400 meters), then increasing to approximately 3 milliliters/liter near the bottom (U.S. Environmental Protection Agency, 1980).

During December 1976, the pH of surface waters in the area averaged 8.1, increased to 8.2 between 75 and 150 feet (25 and 50 meters) depth, and then decreased to a minimum of 7.9 at 1,200 feet (400 meters) depth. During April 1977, pH values were significantly lower, averaging 7.6 at the surface, increasing to 7.7 between 300 and 450 feet (100 and 150 meters) depth, and finally decreasing to 7.6 at 1,200 feet (400 meters) depth (U.S. Environmental Protection Agency, 1980).

Heavy metals concentrations in the water column may be caused by natural background levels in volcanic rocks and corals. The total water column concentrations of silver, cadmium, chromium, and copper in this area are below the minimum detection limit of 1 micrograms/liter. Lead and nickel are below the minimum detection limits of 5 micrograms/liter and 4 micrograms/liter, respectively. An analysis for mercury and zinc yielded abnormally high values that were thought to be caused by contamination of the sample (U.S. Environmental Protection Agency, 1980).

Nutrients concentration measurements in this area of phosphate, total phosphorus, and nitrate-nitrite concentrations, are low in the surface layers, increasing with depth, with the greatest increases occurring below a depth of 450 feet (150 meters). These measurements are typical of oceanic waters. Ammonium concentrations vary, generally decreasing with depth (U.S. Environmental Protection Agency, 1980).

Surface currents around the Hawaiian Islands are generally east to west with a typical speed of 10 inches per second (25 centimeters per second). At the depth of *Ehime Maru*, current velocity is expected to be less than 4 inches per second (10 centimeter per second) (Flament, et al., 1996).

3.1.2 TRANSIT ROUTE TO THE SHALLOW-WATER RECOVERY SITE

Water quality is expected to be relatively high from the current location to the shallow-water recovery site, where the human-caused pollutants described in section 3.1.3 may occur.

3.1.3 REEF RUNWAY SHALLOW-WATER RECOVERY SITE

Basic water quality standards applicable to all waters in Hawaii are that they shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including the following:

- Materials that will settle to form objectionable sludge or bottom deposits
- Floating debris, oil, grease, scum, or other floating materials
- Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to produce objectionable color, turbidity, or other conditions in the receiving waters
- High or low temperatures; biocides; pathogenic organisms; toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water
- Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life
- Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works; highways; subdivisions; recreational, commercial, or industrial developments; or the cultivation and management of agricultural lands (State of Hawaii, 2000)

The State of Hawaii classifies the marine waters within the ROI as Class A. It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge that has not received the best degree of treatment or control compatible with the criteria established for this class (State of Hawaii, 2000).

Human-caused pollutants, while well mixed, may degrade water quality at the site. Pollutants can generally be characterized as being derived from non-point sources and point sources.

Non-point source pollution is mainly caused by surface runoff moving over and through the ground, carrying contaminants. Rainwater, running off roofs, lawns, streets, industrial sites, and pervious and impervious areas, comprises surface runoff. As urban runoff travels overland, it can pick up sediment and debris; rubber, oil, grease, and other automobile-related residuals; lawn and garden fertilizers and pesticides; and lead, zinc, asbestos, PCBs, and a host of other pollutants (Belt Collins Hawaii, 1993).

The National Pollutant Discharge Elimination System program is administered by the State of Hawaii's Department of Health, which regulates point sources of pollution. Major point source discharges to Mamala Bay are those from the Sand Island, Honouliuli, and Fort Kamehameha Wastewater Treatment Plants outfalls. Minor point source discharges are those from approximately 30 industrial and agricultural sources. Point source discharges are the sources of conventional pollutants, including biochemical oxygen demand, total suspended solids, together with nutrients, indicator bacteria, pathogenic microorganisms, and some metals (Colwell, Orlob, and Schubel, 1996).

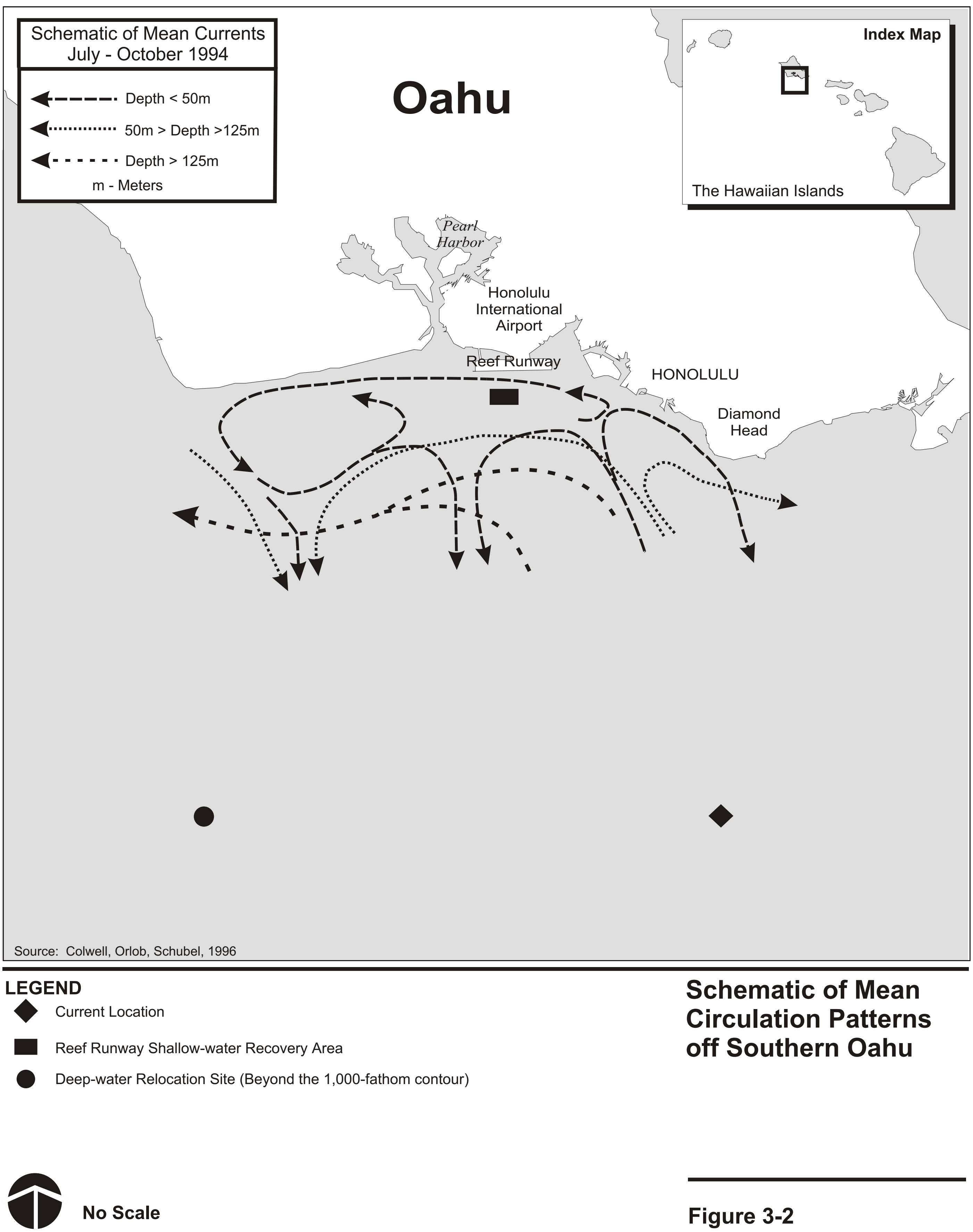
The Reef Runway shallow-water recovery site is near the center of Mamala Bay (see figure 2-9). Past studies of Mamala Bay have shown that near-shore marine water quality degradation frequently occurs at the mouths of streams and storm-drain outfalls following substantial rainfall. This degradation can include petroleum products and pathogenic organisms, the concentrations of which occasionally exceed state water quality standards (Teruya, 2001). Major sources of pollutants at the site are industrial activities in the area of, and streams that flow into, Honolulu Harbor, Pearl Harbor, and Keehi Lagoon.

Shore-based activities from non-maritime sources are the major cause of petroleum product releases into Oahu waters. Shoreline releases, although numerous, are generally "sheens." They typically occur from street or parking runoff, which is flushed by rainwater into a storm drain and then to the waterway (U.S. Coast Guard, 1998).

However, water quality typically recovers relatively rapidly following storm runoff because of dilution and dispersion. Ocean circulation in Mamala Bay is extremely complex, driven largely by tidal fluctuations with major components paralleling the shoreline, but influenced seasonally by thermal stratification and trade and Kona winds. Peak currents of about 20 inches per second (50 centimeters per second) were measured at the Sand Island wastewater treatment plant outfall located about 3 miles (4.8 kilometers) southeast of the Reef Runway shallow-water recovery site in approximately 250 feet (75 meters) of water. Figure 3-2 shows a schematic of the mean current circulation patterns in Mamala Bay from July to October 1994 (Colwell, Orlob, and Schubel, 1996).

3.1.4 TRANSIT ROUTE TO THE DEEP-WATER RELOCATION SITE

Water quality at the shallow-water recovery site, at the beginning of the transit route, is subject to the man-made pollutants described in section 3.1.3, but water quality is expected to be relatively high along the transit route away from the shallow-water site toward the deep-water relocation site.



Schematic of Mean Circulation Patterns off Southern Oahu

Figure 3-2

3_2MeanCurrent060101

3.1.5 DEEP-WATER RELOCATION SITE

Water quality at the deep-water relocation site should be similar to water quality at the current location described in section 3.1.1. Current velocity is expected to be about 2 inches per second (5 centimeter per second) or less at the deep-water relocation site.

3.2 MARINE BIOLOGICAL RESOURCES

Complex marine ecosystems occur in Hawaiian waters to depths of 16,500 feet (5,000 meters) and extend inland from the coasts to include coastal marine ponds. Several factors control the variety, distribution, and abundance of marine life, including geographic isolation, subtropical climate, storm waves, and human-caused pollution and development.

Region of Influence

The biological resource affected environment sections emphasize the existing marine biological conditions in the areas around the current location, the transit route to the shallow-water recovery site, the shallow-water recovery site, the transit route to the deep-water relocation site, and the deep-water relocation site.

Marine Environment

All of the activities necessary to implement the Proposed Action would be conducted in the nearshore marine environment. Therefore, the emphasis in this section is on marine ecosystems and biota, including seabirds, shorebirds, and coastal waterbirds. Terrestrial biological resources are not addressed since those areas where elements of the Proposed Action would take place onshore are already developed and disturbed. The existing marine biological environment addresses four principal attributes: (1) marine fish and Essential Fish Habitat (EFH); (2) marine mammals; (3) migratory birds associated with the marine environment; and (4) threatened and endangered species. Shorebirds are addressed, just for the shallow-water recovery site. In addition, a brief discussion on biological diversity in the marine environment is provided for context.

Biological Diversity

Although oceans have fewer species of plants and animals than terrestrial and fresh water environments, an incredible variety of living things reside in the ocean. Marine life ranges from microscopic one-celled organisms to the world's largest animal, the blue whale. Ocean plants and plant-like organisms use sunlight and the minerals in sea water to grow. Sea animals eat these organisms and one another. Marine plants and plant-like organisms can live only in the sunlit surface waters of the ocean, the photic zone, which extends to only about 330 feet (100 meters) below the surface. Beyond the photic zone, the light is insufficient to support plants and plant-like organisms. Animals, however, live throughout the ocean from the surface to the greatest depths.

Marine biological communities can be divided into two broad categories: pelagic and benthic. Pelagic communities live in the water column and have little or no association with the bottom, while benthic communities live within, upon, or associated with, the bottom (Thorne-Miller & Catena, 1991).

The organisms living in pelagic communities may be drifters (plankton) or swimmers (nekton). The plankton includes larvae of benthic species, so a pelagic species in one ecosystem may be a benthic species in another. The plankton consists of plant-like organisms (phytoplankton) and animals (zooplankton) that drift with the ocean currents, with little ability to move through the water on their own. The mostly one-celled phytoplankton float in the photic zone, where the organisms obtain sunlight and nutrients, and serve as food for the zooplankton and for some larger marine animals. The zooplankton consists of many kinds of animals, ranging from one-celled organisms to jellyfish up to 6 feet (2 meters) wide, which live in both surface and deep waters of the ocean. Crustaceans make up about 70 percent of all zooplankton. While some zooplankton float about freely throughout their lives, many spend only the early part of their lives as plankton. As adults some become strong swimmers and join the nekton; others settle to the seafloor or attach themselves to it and become part of the benthos.

The nekton consists of animals that can swim freely in the ocean. They are strong swimmers and include fish, squids, and marine mammals. Most species of nektonic animals live near the sea surface, where food is plentiful, but many others live in the deep ocean. Fish are the most important nekton, with over 13,000 kinds of fish living in the ocean. Squids are free-swimming mollusks that live in both surface and deep waters. Nektonic mammals, including porpoises and whales, remain in the ocean for their entire lives. Other marine mammals, such as the Hawaiian monk seal, spend time on land.

It is thought that pelagic systems are controlled primarily by physical factors, including temperature, nutrients, amount of light in the surface waters, and disturbances in the water structure. The latter occurs when winds and other atmospheric conditions drive changes in the circulation patterns of ocean waters. As a result, there are vertical changes in the temperature and nutrient distribution, which in turn affect the vertical distribution of species. There is no clear evidence of biological factors controlling species diversity in these ecosystems, but species interactions have not been well studied (Thorne-Miller & Catena, 1991).

Benthic communities, or the benthos, are made up of marine organisms that live on or near the seafloor. They may burrow in the seafloor, attach themselves to the bottom, or crawl or swim about within the bottom waters. Where sunlight reaches the seafloor, the benthos includes plants and plant-like organisms, such as seagrass, which become anchored to the bottom. Among the common animals that live on the seafloor are clams, crabs, lobsters, starfish, and several types of worms. Bottomfish are fish that have adapted to life on the seafloor. Barnacles, clams, oysters, and various snails and worms are among the animals that begin life as zooplankton, but on reaching maturity sink to the seafloor and become part of the benthos.

The greatest known diversity of marine species exists in benthic communities, especially in coral reefs. The benthic environment includes the intertidal shore; the shallow subtidal shelf; the deep abyssal plains; and isolated ecosystems such as coral reefs, seamounts, and deep-sea trenches. The substrate may vary considerably, with distinct differences between hard-bottom and soft-bottom communities. The type of bottom has a big effect on the nature of the community that lives there. Beyond that single physical factor, species diversity is maintained by biological mechanisms—competition, predation, larval recruitment, and biological structuring of the substrate—and/or physical mechanisms, such as nutrients, light, waves, and currents (Thorne-Miller & Catena, 1991).

Marine Fish, Essential Fish Habitat, and Coral

Much of what is known about the biology of the deep ocean waters surrounding the Hawaiian Islands is based on limited information gleaned from studies on sport and commercial fisheries. Pelagic ocean and deep seafloor (benthic) ecosystems occur in the deep open waters beyond the neritic shallow-water zone around all the islands and on, and above, the seafloor at depths greater than 660 feet (200 meters). Pelagic ocean waters are exposed to swells, currents, and winds from all directions, generally beyond the sheltering effects of the islands. Deep currents and eddies are also associated with this zone. Sunlight is absent on the deep seafloor. Basalt and carbonate rock substrates are common on slopes, with sediments prevalent on flatter surfaces. Bottom sediments surrounding Oahu are composed largely of muds washed as organic matter (detritus) from the adjacent islands, and sand and gravel of shallow-water origin.

Phytoplankton are the only abundant plants in the pelagic zone; living plants are rare or absent on the deep seafloor. Zooplankton, fishes, squids, sea turtles, marine mammals, and various seabirds forage in neritic or pelagic waters. At depths in excess of 330 feet (100 meters), many benthic organisms live where there is little or no light and maintain themselves on detritus and planktonic organisms in the water column.

The Magnuson-Stevens Act defines EFH as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. "Waters," when used for the purpose of defining EFH, include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include historical areas of use where appropriate. Substrate includes sediment, hard bottom, underlying structures, and associated biological communities. The designation of EFH by the Western Pacific Regional Fishery Management Council was based on the best scientific data available. Careful judgment was used in determining the extent of EFH that should be designated to ensure that sufficient habitat in good condition is available to maintain a sustainable fishery and the managed species contribution to a healthy ecosystem.

National Marine Fisheries Service guidance governing implementation of the EFH amendments calls for the identification of habitat areas of particular concern. Habitat areas of particular concern could need higher levels of protection than other habitat from adverse effects, including impacts from non-fishing related activities as well as from fishing and activities supporting fishing industries. Habitats that are limited geographically or are unusually productive may be designated as reserves or sanctuaries where appropriate. Identifying potentially threatening activities to habitat areas of particular concern is a complex task, since impacts from different activities, or from the same activity repeated over time, can be cumulative throughout the ecosystem.

To manage the EFH areas, the National Marine Fisheries Service has placed the managed species in four categories: bottomfish management unit species, pelagic management unit species, crustacean management unit species, and precious coral management unit species.

Except for major commercial species, little is known about the life histories, habitat utilization patterns, food habits, or spawning behavior of most adult bottomfish and seamount groundfish species. Furthermore, very little is known about the distribution and habitat requirements of juvenile bottomfish.

The distribution of adult bottomfish is closely linked to suitable physical habitat. Unlike the U.S. mainland with its continental shelf ecosystems, Pacific islands are primarily volcanic peaks with steep drop-offs and limited shelf ecosystems. The bottomfish management unit species under the Western Pacific Regional Fishery Management Council's jurisdiction are found concentrated on the steep slopes of deep-water banks. The approximately 660-foot (200-meter) isobath is commonly used as an index of bottomfish habitat. Adult bottomfish are usually found in habitats characterized by a hard substrate of high structural complexity. Bottomfish populations are not evenly distributed within their natural habitat; instead they are dispersed in a non-random, patchy fashion.

There is regional variation in species composition, as well as a relative abundance of the bottomfish management unit species of the deep-water bottomfish complex. The target species are generally found at depths of approximately 160 to 890 feet (50 to 270 meters).

The Western Pacific Regional Fishery Management Council has designated this area as bottomfish EFH. The species designations include deep-slope bottomfish (shallow- and deepwater) and seamount groundfish complexes. Shallow-water species are those in the 0- to 330-foot (0- to 100-meter) depths. Deep-water species are those in the approximately 330- to 1,300-foot (100- to 400-meter) depths. Because of the known depth and bottom types preferred by bottomfish, and the pelagic nature of their eggs and larvae, the Western Pacific Regional Fishery Management Council has designated the water column and all bottom habitats from the shoreline to a depth of 1,300 feet (400 meters) around the Hawaiian Islands as EFH. The Western Pacific Regional Fishery Management Council has also designated all escarpments and slopes between approximately 130 to 920 feet (40 to 280 meters) as habitat areas of particular concern.

The life histories of most of the commercial, recreational, and other fish species (marketable, non-marketable, and sharks) are not well known. Most are pelagic spawners. However, the National Marine Fisheries Service has designated the marine environment from the shore to the 12-nautical-mile (22-kilometer) limit as EFH. Areas of most concern in Hawaii are escarpments, locations of high structural complexity, live coral heads and reefs, and nursery areas. Examples include coral reefs, fringing reefs, lagoons, estuaries, tidal mangrove vegetation, and seagrass beds. There are large gaps in the scientific knowledge of the basic life histories and habitat requirement for many of the species that make up the pelagic management unit species. Therefore the Western Pacific Regional Fishery Management Council has adopted a 3,300-foot (1,000-meter) depth as a lower boundary of the EFH for pelagic management unit species, and 660 feet (200 meters) from the shoreline to the outer limit of the Exclusive Economic Zone (EEZ) as the upper limit of the EFH covering the eggs and larvae of the pelagic management unit species. The EEZ extends from seaward of the state's boundary out to 200 nautical miles (370 kilometers) from land.

Spiny lobsters are found throughout the Indo-Pacific Region. All spiny lobsters in the western Pacific region belong to the family Palinuridae. The slipper lobsters belong to the family Scyllaridae. The Hawaiian spiny lobster (*Panulirus marginatus*) is endemic to Hawaii and is the primary species of interest in the Northwestern Hawaiian Islands fishery. In Hawaii, adult spiny lobsters are typically found on rocky substrate in well-protected areas, in crevices, and under rocks. The reported depth of the Hawaiian spiny lobster is from approximately 10 to 660 feet (3 to 200 meters), but is generally most abundant in waters of 300 feet (90 meters) or less. The Kona crab, family Raninidae, is taken in low numbers in the Northwestern Hawaiian Islands fishery. The Western Pacific Regional Fishery Management Council has designated the EFH for crustacean management unit species based on complexes or assemblages. The two complexes are the spiny and slipper lobster complex and the Kona crab complex.

For spiny lobster larvae, the EFH is the water column from the shoreline to the outer limit of the EEZ down to a depth of 450 feet (150 meters). The EFH for juvenile and adult spiny lobster is designated as the bottom habitat from the shoreline to a depth of 330 feet (100 meters). The Council has also designated all banks with summits less than 95 feet (30 meters) in the Northwestern Hawaiian Islands as habitat areas of particular concern for spiny lobster.

Black, pink, gold, and bamboo corals, collectively referred to as precious corals, occur in deep inter-island channels and off promontories at depths between 50 and 4,920 feet (15 and 1,500 meters). These coral species are included as management unit species in the Precious Corals Fisheries Management Plan. The Council has designated the six known beds of deep-water precious coral (pink, gold, and bamboo) as EFH for precious coral management unit species. The six known precious coral beds are located at Keahole Point, Makapuu, Kaena Point, Wespac, Brooks Bank, and 180 Fathom Bank. In addition, the agency has also designated the three black coral beds in the main Hawaiian Islands as EFH for precious coral management unit species. The three black coral beds are located between Milolii and South Point on Hawaii, Auau channel between Maui and Lanai, and the southern border of Kauai. The Council has designated three of the six known deep-water precious coral beds (Makapuu, Brooks Bank, Wespac) are designated as habitat areas of particular concern. For black corals, the Council has designated Auau channel as habitat areas of particular concern.

Marine Mammals

Both the Endangered Species Act and the Marine Mammal Protection Act protect the marine mammals present in the waters around the Hawaiian Islands. Table 3-2 identifies those species that are not listed as threatened or endangered, but are protected by the Marine Mammal Protection Act. The listed species are discussed under the heading Threatened and Endangered Species below.

Table 3-2: Protected Marine Mammals Found in Hawaiian Waters

Type	Common Name	Scientific Name
Odontocetes		
Toothed Whale	Bottlenose Dolphin	*Tursiops truncatus*
Toothed Whale	Hawaiian Spinner Dolphin	*Stenella longirostris*
Toothed Whale	Spotted Dolphin	*Stenella attenuata*
Toothed Whale	Striped Dolphin	*Stenella coeruleoalba*
Toothed Whale	Blainville's Beaked Whale	*Mesoplodon densirostris*
Toothed Whale	Cuvier's Beaked Whale	*Ziphius cavirostris*
Toothed Whale	False Killer Whale	*Pseudorea crassidens*
Toothed Whale	Killer Whale	*Orcinus orca*
Toothed Whale	Melon-headed Whale	*Peponocephala electra*
Toothed Whale	Risso's Dolphin	*Grampus griseus*
Toothed Whale	Rough-toothed dolphin	*Steno bredanensis*
Toothed Whale	Short-finned Pilot Whale	*Globicephala macrorhynchus*
Toothed Whale	Pygmy Sperm Whale	*Kogia breviceps*
Toothed Whale	Dwarf Sperm Whale	*Kogia simus*
Mysticetes		
Baleen Whale	Bryde's Whale	*Balaenoptera edeni*

Source: U.S. Fish and Wildlife Service 2001, unpublished tables.

Migratory Birds

Thirty-nine species of migratory seabirds are known to occur in the Hawaiian Island chain. Twenty-two of these species breed in Hawaii. The foraging range of some of these species is estimated to be between 98 and 300 miles (159 and 480 kilometers). Seabirds (e.g., red-footed boobies (*Sula sula*), masked boobies (*Sula dactylatra*), white-tailed tropicbirds (*Phaethon lepturus*), red-tailed tropicbirds (*Phaethon rubricauda*), sooty terns (*Sterna fuscata*), brown noddies (*Anous stolidus*), and others from the colonies located at Kaula, Niihau, Kauai, and Oahu may be observed foraging in the coastal pelagic waters that surround all of these islands. The short-tailed albatross (*Phoebastria albatrus*) has been observed on Pacific Missile Range Facility, Kauai.

Migratory shorebirds and waterbirds are also relatively common (table 3-3) in the Hawaiian Islands, although within the ROI, the number of species present is limited and is potentially associated with the shallow-water recovery site only.

Table 3-3: Migratory Birds in the Hawaiian Islands

Scientific Name	Common Name	Status
Migratory Seabirds		
Phoebastria albatrus	Short-tailed Albatross	Vo E
Phoebastria nigripes	Black-footed Albatross	Bi
Phoebastria immutabilis	Laysan Albatross	Bi
Fulmarus glacialis	Northern Fulmar	Vo
Pterodroma phaeopygia	Hawaiian Petrel	Bes E
Pterodroma externa	Juan Fernandez Petrel	Vo
Pterodroma cervicalis	White-necked Petrel	Vo
Pterodroma inexpectata	Mottled Petrel	Vo
Pterodroma hypoleuca	Bonin Petrel	Bi
Pterodroma nigripennis	Black-winged Petrel	Vo
Bulweria bulwerii	Bulwer Petrel	Bi
Puffinus carneipes	Flesh-footed Shearwater	Vo
Puffinus pacificus	Wedge-tailed Shearwater	Bi
Puffinus griseus	Sooty Shearwater	Vr
Puffinus tenuirostris	Short-tailed Shearwater	Vo
Puffinus nativitatis	Christmas Shearwater	Bi
Puffinus newelli	Newell's Shearwater	Be T
Oceanodroma leucorhoa	Leach Storm-Petrel	Vr
Oceanodroma castro	Band-rumped Storm-Petrel	Bi
Oceanodroma tristrami	Tristram Storm-Petrel	Bi
Phaethon lepturus	White-tailed Tropicbird	Ri
Phaethon rubricauda	Red-tailed Tropicbird	Bi
Sula dactylatra	Masked Booby	Ri
Sula leucogaster	Brown Booby	Ri
Sula sula	Red-footed Booby	Ri
Fregata minor	Great Frigatebird	Ri
Stercorarius pomarinus	Pomarine Jaeger	Vr
Larus atricilla	Laughing Gull	Vo
Larus philadelphia	Bonaparte Gull	Vo
Larus delawarensis	Ring-billed Gull	Vo
Larus argentatus	Herring Gull	Vo
Larus glaucescens	Glaucous-winged Gull	Vo

Table 3-3: Migratory Birds in the Hawaiian Islands (Continued)

Scientific Name	Common Name	Status
Migratory Seabirds (Continued)		
Sterna antillarum	Least Tern	Vo
Sterna lunata	Gray-backed Tern	Bi
Sterna fuscata	Sooty Tern	Bi
Anous stolidus	Brown Noddy	Ri
Anous minutus	Black Noddy	Res
Procelsterna cerulea	Blue-gray Noddy	Ri
Gygis alba	White Tern	Ri
Migratory Waterbirds		
Dendrocygna bicolor	Fulvous Whistling-Duck	Ri
Branta bernicla	Brant	Vo
Brantacanadensis	Canada Goose	Vo
Anas crecca	Green-winged Teal	Vr
Anas platyrhynchos	Mallard	Vo
Anas acuta	Northern Pintail	Vc
Anas querquedula	Garganey	Vo
Anas discors	Blue-winged Teal	Vo
Anas clypeata	Northern Shoveler	Vc
Anas americana	American Wigeon	Vr
Aythya collaris	Ring-necked Duck	Vo
Aythya afinis	Lesser Scaup	Vr
Gallinula chloropus sandvicensis	Hawaiian Moorhen	Be E
Anas uyvilliana	Hawaiian Duck	Be E
Himantopus mexicanus knudseni	Hawaiian Black-necked Stilt	Be E
Fulica alai	Hawaiian Coot	Be E
Migratory Shorebirds		
Egretta caerulea	Little Blue Heron	Vo
Nycticorax nycticorax	Black-crowned Night-Heron	Ri
Pluvialis squatarola	Black-bellied Plover	Vr
Pluvialis dominica	Lesser Golden-Plover	Vc
Charadrius semipalmatus	Semipalmated Plover	Vo
Tringa flavipes	Lesser Yellowlegs	Vr
Heteroscelus incanus	Wandering Tattler	Vc

Table 3-3: Migratory Birds in the Hawaiian Islands (Continued)

Scientific Name	Common Name	Status
Migratory Shorebirds (Continued)		
Numenius tahitiensis	Bristle-thighed Curlew	Vr
Limosa lapponica	Bar-tailed Godwit	Vo
Arenaria interpres	Ruddy Turnstone	Vc
Calidris alba	Sanderling	Vc
Calidris mauri	Western Sandpiper	Vo
Calidris minutilla	Least Sandpiper	Vo
Calidris melanotos	Pectoral Sandpiper	Vr
Calidris acuminata	Sharp-tailed Sandpiper	Vr
Calidris alpina	Dunlin	Vr
Philomachus pugnax	Ruff	Vo
Limnodromus griseus	Short-billed Dowitcher	Vo
Limnodromus scolopaceus	Long-billed Dowitcher	Vr
Gallinago gallinago	Common Snipe	Vo
Phalaropus tricolor	Wilson Phalarope	Vo

Source: U.S. Fish and Wildlife Service 2001, unpublished tables.

Symbols for Status:
E = Endangered. **T** = Threatened. **Be** = Breeder; species breeds only in Hawaii. **Bes** = Breeder; Species also breeds elsewhere; Hawaiian subspecies breeds only in Hawaii. **Bi** = Breeder; Hawaiian also breeds elsewhere. **Res** = Resident; indigenous species; Hawaiian subspecies is endemic. **Ri** = Resident; indigenous species; Hawaiian form is not endemic. **Vo** = Visitor; occasional to frequent migrant to Hawaii. **Vr** = Visitor; regular migrant to Hawaii in small numbers.

Threatened and Endangered Species

An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Endangered marine mammals found in Hawaii include the Hawaiian monk seal, humpback whale, blue whale, fin whale, and sperm whale (table 3-4). The Marine Mammal Protection Act also protects all of these endangered marine mammals.

Also listed are two turtles: the green sea turtle (*Chelonia mydas*) and the hawksbill sea turtle (*Eretmochelys imbricata*). There are six endangered migratory bird species in the Hawaiian Islands: short-tailed albatross, Hawaiian petrel (*Pterodroma phaeopygia*), Hawaiian moorhen (*Gallinula chloropus sanvicensus*), Hawaiian duck (*Anas wyvilliana*), Hawaiian coot (*Fulica alai*), and Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*). There is also one threatened seabird: Newell's shearwater (*Puffinus newelli*). The threatened and endangered species are discussed below.

Table 3-4: Threatened and Endangered Marine Mammals, Turtles, Seabirds, and Waterbirds found in Hawaiian Waters

Type	Common Name	Scientific Name	Status
Toothed Whale	Sperm Whale	*Physeter macrocephalus*	Endangered
Mysticete Whale	Humpback Whale	*Megaptera evangelae*	Endangered
Mysticete Whale	Blue Whale	*Balaenoptera musculus*	Endangered
Mysticete Whale	Fin Whale	*Balaenopter physalus*	Endangered
Seal and Sea Lion	Hawaiian Monk Seal	*Monachus schauinslandi*	Endangered
Sea Turtle	Green Sea Turtle	*Chelonia mydas*	Threatened
Sea Turtle	Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered
Seabird	Hawaiian Petrel	*Pterodroma phaeopygia*	Endangered
Seabird	Short-Tailed Albatross	*Phoebastria albatrus*	Endangered
Seabird	Newell's Shearwater	*Puffinus newelli*	Threatened
Waterbird	Hawaiian Moorhen	*Gallinula chloropus sandvicensis*	Endangered
Waterbird	Hawaiian Duck	*Anas wyvilliana*	Endangered
Waterbird	Hawaiian Coot	*Fulica alai*	Endangered
Waterbird	Hawaiian Black-Necked Stilt	*Himantopus mexicanus knudseni*	Endangered

Source: U.S. Fish and Wildlife Service 2001, unpublished tables.

Humpback Whale

During the months of January through April, humpback whales are the most common marine mammal species found in the Hawaiian waters (Mobley, 1997). Most humpback whales depart Hawaii for the northern feeding grounds before June. The original population of humpback whales may have been as high as 120,000 worldwide. By the 1970s, the population has been reduced to about 10,000 to 12,000 worldwide. The major cause for the decline was commercial whaling, which was banned in 1966 and stopped entirely during the 1970s. Since then, the population in the Hawaiian Islands has risen slowly from under 1,000 to between 3,000 and 4,000. Humpback whales generally migrate to the Hawaiian Islands each winter from northern feeding grounds. The whales are primarily seen between December and May of each year. The humpback whale is the only animal that has an entire marine sanctuary dedicated to its survival. The Hawaiian Islands Humpback Whale National Marine Sanctuary covers areas off the shorelines of all the major Hawaiian Islands, with an emphasis on areas generally within the 600-foot (183-meter) contour (isobath) between the islands of Molokai, Lanai, and Maui, including the Penguin Bank. The sanctuary area encompasses 1,300 square miles (3,370 square kilometers), much of it within 3 miles (4.8 kilometers) of the shoreline.

Sperm Whale

Sperm whales are listed as endangered, but in fact are considered to be the most abundant of the large whale species, with an estimated 1.9 million animals worldwide (Rice, 1989). Sperm whales migrate to the higher latitudes during the summer with the mature males migrating much farther north than females and the younger males. In the Pacific Ocean, females and younger whales usually remain in tropical and temperate waters. Males may continue north to the Gulf of Alaska and the Aleutians. Females and younger animals may be restricted in their migrations by warmer waters, and many of the larger males return during the winter months to breed. Historically, sperm whaling grounds in the Pacific Ocean south of 40 degrees North latitude were located around the Hawaiian Islands. Sperm whales are deep-diving animals and are generally found in deep waters. All sperm whales sighted in 1993 to 1998 aerial surveys were found in waters deeper than 6,000 feet (1,800 meters). When they have been found relatively close to shore, sperm whales are usually associated with sharp increases in bottom depth where upwelling likely occurs and biological productivity is high. They can dive to depths exceeding 6,500 feet (2,000 meters) and may remain submerged for more than an hour.

Fin Whale

At 70 feet (21 meters) long, the fin whale is the second largest whale in the world. Listed as endangered, the fin whale lives in all oceans and seas of the world from tropical to polar latitudes. They tend to be very nomadic and migrate several thousand miles to equatorial waters. During the winter, they fast almost completely, living off their fat reserves. Mating occurs throughout the winter, and young are born a year later between December and April. The fin whale often feeds by coursing through the water on its side, straining out small fish and krill between its baleen plates. They are one of the fastest of the large whales, cruising at an average speed of 12 knots (22 kilometers per hour). These whales avoid noisy boats, but will swim up beside a stopped vessel. Fin whales migrate into Hawaiian waters mainly in autumn and winter and are rare in Hawaiian waters. The status of fin whales in Hawaiian waters is unknown and there is insufficient data to evaluate trends in abundance. (National Oceanic and Atmospheric Administration, 2000)

Blue Whale

The blue whale is currently one of the world's most endangered whales and is extremely rare in Hawaii. The blue whale, with lengths up to 100 feet (30 meters), is the largest animal on earth. Blue whales are found in open oceans from the waters of the extreme Southern Hemisphere to the Aleutian Islands off Alaska at the northern boundary of the Pacific Ocean. They spend their summers in polar waters because food production (krill) is higher there. In the winter blue whales migrate several thousand miles to warmer tropic and subtropic areas to breed and calve. During the winter they fast; the fat on their body is enough to see them through the winter. The status of fin whales in Hawaiian waters is unknown and there is insufficient data to evaluate trends in abundance. (National Oceanic and Atmospheric Administration, 2000)

Hawaiian Monk Seal

While in previous times it was assumed that the endangered Hawaiian monk seal only inhabited the Northwestern Hawaiian Islands, they have recently been observed near the main Hawaiian Islands. Data from the Hawaiian Islands Humpback Whale National Marine Sanctuary Final Environmental Impact Statement indicated that as many as 39 sightings near the island of Oahu may occur in a single year. Although the seals must obviously swim between the islands, they are most often seen close to the islands, including one early observation near the entrance to Pearl Harbor in July 1978. The seal's breeding season tends to occur from spring to early summer, with most births occurring during March to May. Pupping occurs on beaches, including at least one pup born on Oahu.

Green Sea Turtle

The green sea turtle is found throughout the tropical Pacific. Although found mostly in the Northwestern Hawaiian Islands (over 90 percent), they are seen around Oahu. No nesting occurs on Oahu. Hatchlings emerge after an incubation period on sandy beaches and then lead a pelagic existence for 3 years. The 3-year-old juveniles then come near shore, mainly on the leeward side of islands, and begin feeding on benthic algae and seagrass for the next 2 years or so. After reaching sexual maturity (20 to 25 years) they migrate to French Frigate Shoals in the Northwestern Hawaiian Islands to breed.

Hawksbill Sea Turtle

The Hawksbill sea turtle is a medium-sized turtle found in tropical waters, often on coral reefs. It is known infrequently in the waters off the Hawaiian Islands. It is a solitary nester and is known to use isolated beaches on the islands of Hawaii and Maui.

Short-tailed Albatross

The short-tailed albatross is a large pelagic bird with long, narrow wings adapted for soaring just above the water surface. The large-beaked birds are long-lived and slow to mature. Nesting habitat is generally flat or sloped sites with sparse or full vegetation on isolated windswept offshore islands with restricted human access. The normal diet is fish, crustaceans, and squid, which come to the ocean's surface at night. Short-tailed albatross once ranged throughout most of the North Pacific Ocean and Bering Sea, with no known nesting colonies on numerous western Pacific Islands in Japan and Taiwan. The short-tailed albatross is currently found on the Izu Islands; Senkaku Islands; and Midway Atoll, Northwestern Hawaiian Islands. Since the mid-1970s about thirty-five sightings of short-tailed albatrosses have occurred during the breeding season on Midway Atoll. The short-tailed albatross was listed on 2 November 2000 as endangered throughout its range. (U.S. Fish and Wildlife Service, 2001)

Hawaiian Petrel

The Hawaiian petrel has a dark gray head, wings, and tail, and a white forehead and belly. Its stout bill is hooked at the tip. The Hawaiian petrel are residents of the central subtropical Pacific Ocean and are known to breed only within the major Hawaiian Islands, where they have well established breeding populations. The largest breeding colony is at Haleakala Crater on Maui. The species is currently known to nest only at elevations above

7,200 feet, where vegetation is sparse and the climate is dry. Nesting burrows are commonly located among large rock outcrops or other areas with suitable underlying soil. The Hawaiian petrel breeds between March and November and spends most of its time in pelagic habitat during the non-breeding season, feeding on fish, crustaceans, and squid. Based on their very limited present distribution and the marginal status of known breeding populations, the Hawaiian petrel was listed as endangered in 1967. (U.S. Fish and Wildlife Service, 1983)

Hawaiian Moorhen

The Hawaiian moorhen, known as the most secretive native waterbird, can generally be found in freshwater marshes, taro patches, irrigation ditches, reedy margins of watercourses, reservoirs, and wet pastures. They favor dense vegetation near open water and floating or barely emergent mats of vegetation. Moorhen do not frequent brackish water and are not generally present in saline habitats. The Hawaiian moorhen generally nests in areas of standing freshwater depths of less than 24 inches (60 centimeters). Hawaiian moorhen nest year-round, but the active season is March through August. The Hawaiian moorhen inhabits the islands of Kauai and Oahu. The Kauai population is distributed in lowland wetlands and valleys. Hawaiian Moorhens are widely distributed on Oahu, mostly between Haleiwa and Waimanalo. The Hawaiian Moorhen is listed as endangered by the U.S. Fish and Wildlife Service. (U.S. Fish and Wildlife Service, 1999)

Hawaiian Duck

The endangered Hawaiian duck uses a wide variety of natural wetland habitats for nesting and feeding including freshwater marshes, coastal ponds, flooded grasslands, streams, and forest swamplands from elevations ranging from sea level to 9,900 feet (3,000 meters). Artificial wetlands (taro, lotus, shrimp, and fish ponds) supplement existing habitat and provide important feeding habitat. Hawaiian ducks eat mollusks, insects, and freshwater vegetation. They nest year-round, but the main breeding season is between January and May. Nests are on the ground near water. The current population, estimated to be 2,500, is found on Niihau, Kauai, Oahu, Maui, and Hawaii. The estimated population on Oahu is 300. On Oahu, Hawaiian ducks frequent wetland complexes on the windward coast and north shore. In addition, several individuals have been reported from the wetlands near Pearl Harbor. (U.S. Fish and Wildlife Service, 1999)

Hawaiian Coot

The Hawaiian coot is a federally listed endangered waterbird endemic to the Hawaiian Islands. They are generally found in the coastal plain, usually found below 1,320 feet (400 meters), and prefer wetland habitats with suitable emergent plant growth interspersed with open water. Hawaiian coots prefer freshwater wetlands and taro patches, but will frequent freshwater reservoirs, brackish wetlands, or rarely saline water. Coots nest in open fresh and brackish ponds, irrigation ditches, on shallow reservoirs, and small openings of marsh vegetation, where they construct floating nests of aquatic vegetation in open water or semi-floating nests anchored to emergent vegetation, or in clumps of wetland vegetation. Although some nesting takes place year-round, nesting mostly occurs from March through September. The Hawaiian coot population of between 2,000 and 4,000 birds currently inhabits all of the main Hawaiian Islands except

Kahoolawe. On Oahu, the Hawaiian coot is regularly recorded at wetlands along the east west, and north shores, and less frequently at wetlands along the south shore and interior reservoirs. (U.S. Fish and Wildlife Service, 1999)

Hawaiian Black-necked Stilt

The endangered Hawaiian black-necked stilt is a wading bird that is found on all main Hawaiian Islands except Kahoolawe. Hawaiian black-necked stilts use a variety of aquatic habitats but are limited by water depth and vegetation cover. They require early successional marshlands with water depth less than 9 inches (24 centimeters), perennial vegetation that is limited and low growing, or exposed tidal flats. Hawaiian black-necked stilts generally forage and nest in different wetland sites, moving between these areas daily. Feeding habitat consists of shallow water that is fresh, brackish, or saline. Nesting occurs on freshly exposed mudflats, interspersed with low-growing vegetation. The nesting season normally extends from March through August, and peaks in May and June. The current population is estimated between 1,200 and 1,600. Oahu has the largest population with the majority of the Hawaiian black-necked stilts found on the north and windward coasts. Isolated populations also exist in Pearl Harbor and along the leeward coast. (U.S. Fish and Wildlife Service, 1999)

Newell's Shearwater

The Newell's shearwater has a glossy black top, white bottom, and black bill that is sharply hooked at the tip. The bird feeds primarily on squid. Newell's shearwater breeds in dense fern habitat with steep mountainous terrain between 500 and 2,300 feet (150 and 700 meters) in elevation. During their nine-month breeding season from April through November, Newell's shearwaters live in burrows. Although they are capable of climbing shrubs and trees before taking flight, it needs an open downhill flight path through which it can become airborne. Newell's shearwaters are residents of the central subtropical Pacific Ocean and are known to breed only within the major Hawaiian Islands. The Newell's shearwater is believed to have had well-established breeding populations on all of the major Hawaiian Islands. Based on their very limited present distribution and the marginal status of breeding populations, the Newell's shearwater was listed as a threatened species in 1975 by the U.S. Fish and Wildlife Service. (U.S. Fish and Wildlife Service, 1983)

3.2.1 CURRENT LOCATION

Marine Fish, Essential Fish Habitat, and Coral

The current location ROI is characterized as a pelagic marine environment, with the Penguin Bank providing a relatively shallow 140-foot (36-meter) environment to the southeast. The pelagic environment is described in detail in section 3.2.

The Western Pacific Regional Fishery Management Council has adopted a 3,281-foot (1,000-meter) depth as a lower boundary of the EFH for pelagic management unit species and 660 feet (200 meters) from the shoreline to the outer limit of the EEZ as the upper limit of the EFH covering the eggs and larvae of the pelagic management unit species.

Therefore, the current location is in this EFH for pelagic management unit species. No known major precious coral beds are located in the current location ROI.

Marine Mammals

While the protected, but not endangered, marine mammal species listed in table 3-2 are not regularly sighted in the current location ROI (Mobley, 1997; Mobley et al., 2000) any of the protected marine mammals could occur in the ROI.

Migratory Birds

The current location is within the potential foraging range of a number of the seabird species. The foraging range of some of these species is estimated to be between 98 and 300 miles (159 and 480 kilometers). Seabirds (e.g., red-footed boobies, masked boobies, white-tailed tropic birds, red-tailed tropic birds, sooty terns, brown noddies, and others from the colonies located at Kaula, Niihau, Kauai, and Oahu may be observed foraging in the coastal pelagic waters that surround all of these islands. The short-tailed albatross has been observed on Pacific Missile Range Facility, Kauai.

Threatened and Endangered Species

It is unlikely that any of the endangered Hawaiian Island marine mammal species would be found in the current location ROI. Humpback whales, will be out of the area on their annual migration to north Pacific waters from June to December. Sperm whales are not often seen around the current location ROI (Mobley et al., 2000). Blue whales and fin whales are extremely rare in Hawaiian waters. Hawaiian monk seals are most often found closer to land. The remaining protected, but not endangered, marine mammal species listed in table 3-2 are not regularly sighted in the ROI (Mobley, 1997; Mobley et al., 2000). Given the wide-ranging transitory nature of the animals, any of them could theoretically be present in the current location ROI.

Three seabird species that occur in the Hawaiian Islands and may occur in the ROI are on the U.S. Fish and Wildlife Service list of threatened and endangered wildlife. The endangered short-tailed albatross is expected to forage in the ROI. Another species that could forage in the ROI is the Hawaiian petrel (*Pterodroma phaeopygia*), an endangered species. One other species, the Newell shearwater (*Puffinus newelli*), is listed as threatened and could also forage in the ROI. The latter two listed species breed in Hawaii.

3.2.2 TRANSIT ROUTE TO THE SHALLOW-WATER RECOVERY SITE

Marine Fish, Essential Fish Habitat, and Coral

The Western Pacific Regional Fishery Management Council has adopted a 3,281-foot (1,000-meter) depth as a lower boundary of the EFH for pelagic management unit species and approximately 660 feet (200 meters) from the shoreline to the outer limit of the EEZ as the upper limit of the EFH covering the eggs and larvae of the pelagic management unit species. The current location is in this EFH, and the transit route would initially start within this EFH and would pass through portions of the EFH until shallower waters are reached near Oahu.

Deep-water bottomfish species exist in the approximately 330- to 1,300-foot (100- to 400-meter) depths. These species make up the bottomfish management unit species. Because of the known depth and bottom types preferred by bottomfish, and the pelagic nature of their eggs and larvae, the Western Pacific Regional Fishery Management Council has designated the water column and all bottom habitats from the shoreline to a depth of approximately 1,300 feet (400 meters) as EFH. The transit route passes through the pelagic management unit species area and enters the EFH for the bottomfish management unit species closer to Oahu.

Black, pink, gold, and bamboo corals, collectively referred to as precious corals, occur in deep inter-island channels and off promontories at depths between 50 and 4,920 feet (15 and 1,500 meters). These coral species are included as management unit species in the Precious Corals Fisheries Management Plan. No known major precious coral beds are located in the ROI along the transit route to the shallow-water recovery site.

Marine Mammals

The probability of the occurrence of protected marine mammals in the transit route corridor is low. Marine mammals aerial surveys conducted between 1993 and 1998 within the 1,000-fathom isobath (6,000 feet, or approximately 1,800 meters) around the Hawaiian Islands sighted the following species of toothed (odontocete) dolphins and whales: striped dolphin, spotted dolphin, spinner dolphin, rough-toothed dolphin, bottlenosed dolphin, Risso’s dolphin, short finned pilot whale, false killer whale, melon-headed whale, and various beaked whales (Mobley et al., 2000). None of these were sighted in the transit corridor ROI.

The probability of sighting the Hawaiian spinner dolphin increases as the depth decreases. The areas in shallow waters, however, will likely contain Hawaiian spinner dolphins. This species regularly (on a daily basis) visits the shallow areas on the lee side of all of the Hawaiian Islands and is particularly well known to occur on the lee side of Oahu. The dolphins are believed to spend the nights off the coast diving and feeding but spend the days in shallow-water areas resting (Norris et al, 1994).

Migratory Birds

The transit corridor between the current location and the shallow-water recovery site are within the potential foraging range of many of the seabird species. The foraging range of some of these species is estimated to be between 98 and 300 miles (159 and 480 kilometers). Seabirds (e.g., red-footed boobies, masked boobies, white-tailed tropicbirds, red-tailed tropicbirds, sooty terns, brown noddies, and others from the colonies located at Kaula, Niihau, Kauai, and Oahu may be observed foraging in the coastal pelagic waters that surround all of these islands. The short-tailed albatross has been observed on Pacific Missile Range Facility, Kauai.

Threatened and Endangered Species

The likelihood of encountering any threatened or endangered marine mammal in the transit route corridor is quite low. Humpback whales are in the ROI between the months of

January and May. The blue whale and fin whale are extremely rare in Hawaiian waters. The endangered Hawaiian monk seal would only be in the area of the transit corridor as transients between islands. The sperm whale would be expected only in the deeper areas of the transit route corridor ROI. However, the potential for their being present would be very low.

The threatened green sea turtle and the endangered hawksbill turtle also occur in the transit route corridor as individuals travel between the Hawaiian Islands.

Three seabird species that occur in the Hawaiian Islands, and may occur in the transit route corridor, are on the U.S. Fish and Wildlife Service list of threatened and endangered wildlife. The endangered short-tailed albatross is expected to forage in the ROI. Another species that could forage in the ROI of the transit corridor, between the current location and the shallow-water recovery site, is the Hawaiian petrel, an endangered species. One other species, the Newell shearwater, is listed as threatened and could also forage in the ROI. The two latter listed species breed in Hawaii.

3.2.3 REEF RUNWAY SHALLOW-WATER RECOVERY SITE

Marine Fish, Essential Fish Habitat, and Coral

Water depths at the Reef Runway shallow-water recovery site range from approximately 50 feet (15 meters) on the north (landward) side, to 300 feet (91 meters) on the south (seaward) side. The seaward reef slope ranges from 5 to 8 percent at depths between 70 and 120 feet (21 and 37 meters). Between 120 and 250 feet (37 and 76 meters) the slope increases to 10 percent on the west and up to 16.5 percent on the east side of the site. A submarine terrace dominated by sand and coral rubble is the most conspicuous physical feature along the north half of the site. The terrace occurs between the 60- and 70-foot (18- and 20-meter) depth contours and ranges from 500 to 1,400 feet (152 to 427 meters) in width. The seaward slope along the terrace has vertical relief estimated at less than 2 feet (0.6 meters).

Limestone rubble, sand, and occasional live corals dominate the substrate at depths above 70 feet (21 meters). Surface relief is about 3 feet (1 meter) or less and results from mounds of coral rubble and live coral. Between depths of 90 and 95 feet (27 and 29 meters) sand is abundant and interspersed with patches of limestone rubble and occasional live coral outcrops. Surface relief is about 2 feet (0.6 meters) or less. Between 95 feet (29 meters) and 130 feet (40 meters) the substrate is dominated by limestone rubble, sand, or sand-veneered limestone with little surface relief (appendix J, part 1). Deep unconsolidated sand comprises the principal substrate at depths between 130 and 300 feet (40 and 90 meters).

The broad terrace that occurs at depths between 60 and 70 feet (18 and 20 meters) demonstrates a variety of habitats, including coral rubble, sand, sand-veneered limestone, and corals. Habitat coverage differs significantly along the terrace and is likely due to the location of fringing reef surge channels in shallower waters to the north. During periods of heavy wave action, rubble and corals are likely transported onto the terrace from shallower, more diverse, inshore waters. Locations on the terrace located in proximity to surge channels therefore demonstrate a greater abundance of limestone rubble. Live corals are generally associated with the areas of rubble. Areas of the terrace that are at some distance from the surge channels are characterized by expansive unconsolidated sand deposits and a general absence of rubble or live coral.

At the time of the surveys, corals were common on the upper reaches of the Reef Runway shallow-water recovery site, but the overall population density is generally low (figure 3-3). The highest coral densities are associated with the seaward face of the ledges and steeper slopes that occur at depths less than 100 feet (30 meters). Cauliflower coral (*Pocillopora meandrina*) was the most common coral present with highest densities occurring in waters of 130 feet (40 meters) or less. Overall coral coverage was generally less than 1 percent in waters of 100 feet (30 meters) or less, although localized areas along the ledges and drop-offs occasionally demonstrated coverage of about 30 percent. An exception to the latter is found on the narrow escarpment located between the 80- and 90-foot (24- and 27-meter) contours where coral coverage ranges from an estimated 40 to 90 percent in localized areas. Other corals present, although generally uncommon, were lobe coral (*Porites lobata*), antler coral (Pocillopora eydouxi), and finger coral (*Porites compressa*). Pockets of coral rubble were often dominated by dead and fragmented finger coral colonies. Bracket-forming coral, possibly *Porites rus* or *Montipora capitata*, is present in 90 feet (27 meters) of water and is occasionally found in deeper waters (appendix J, part 1). Earlier studies off the Reef Runway have identified the coral *Pavona duerdeni* and the zooanthid *Palythoa tuberculosa* as common on the upper reef slope. The same study also identified finger coral as the dominant coral at a depth of 65 feet (20 meters) (U.S. Army Corps of Engineers, 1979).

The fish fauna is generally limited to small coral-associated species that were generally found in or adjacent to live coral outcrops. Fish families identified in the Reef Runway shallow-water recovery site ROI include muraenids (moray eels), aulostomids (trumpetfish), holocentrids (squirrelfishes), lutjanids (snappers), mullids (goatfishes), chaetodontids (butterfly fishes), pomacentrids (damselfishes), labrids (wrasses), scarids (parrotfishes), acanthurids (surgeonfishes), balistids (triggerfishes), ostraciids (trunkfishes), tetraodontids (puffers), carangids (jacks/trevally), sphyraenids (barricuda), and the zanclid *Zanclus cornutus.* Large schools of the Hawaiian dascyllus (*Dascyllus albisella*), occur in, or hover in, proximity to antler and cauliflower coral colonies. A yellowmargin moray (*Gymnothorax flavimarginatus)* and several introduced grouper are also present on the site. Two surveys, conducted on April 25 and May 2, 2001 by the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Department of Land and Natural Resources, confirms the general characteristics of the seafloor of the site, and the organisms present (appendix J, part 2).

Earlier studies have reported a moderately diverse fish fauna off the reef face. Species identified as abundant in the area included convict tang (*Acanthurus triostegus)*, brown surgeonfish (*A. nigrofuscus),* goldring surgeonfish (*Ctenochaetus strigosus),* saddle wrasse *(Thalassoma duperreyi),* multiband butterflyfish *(Chaetodon multicinctus),* blacktail chromis *(Chromis vanderbilti),* Pacific gregory (*Stegastes fasciolatus),* Hawaiian whitespotted toby *(Canthigaster jactator),* and parrotfish (*Scarus* sp.) (U.S. Army Corps of Engineers, 1979).

Expanded Area Reef Runway Benthic Habitats

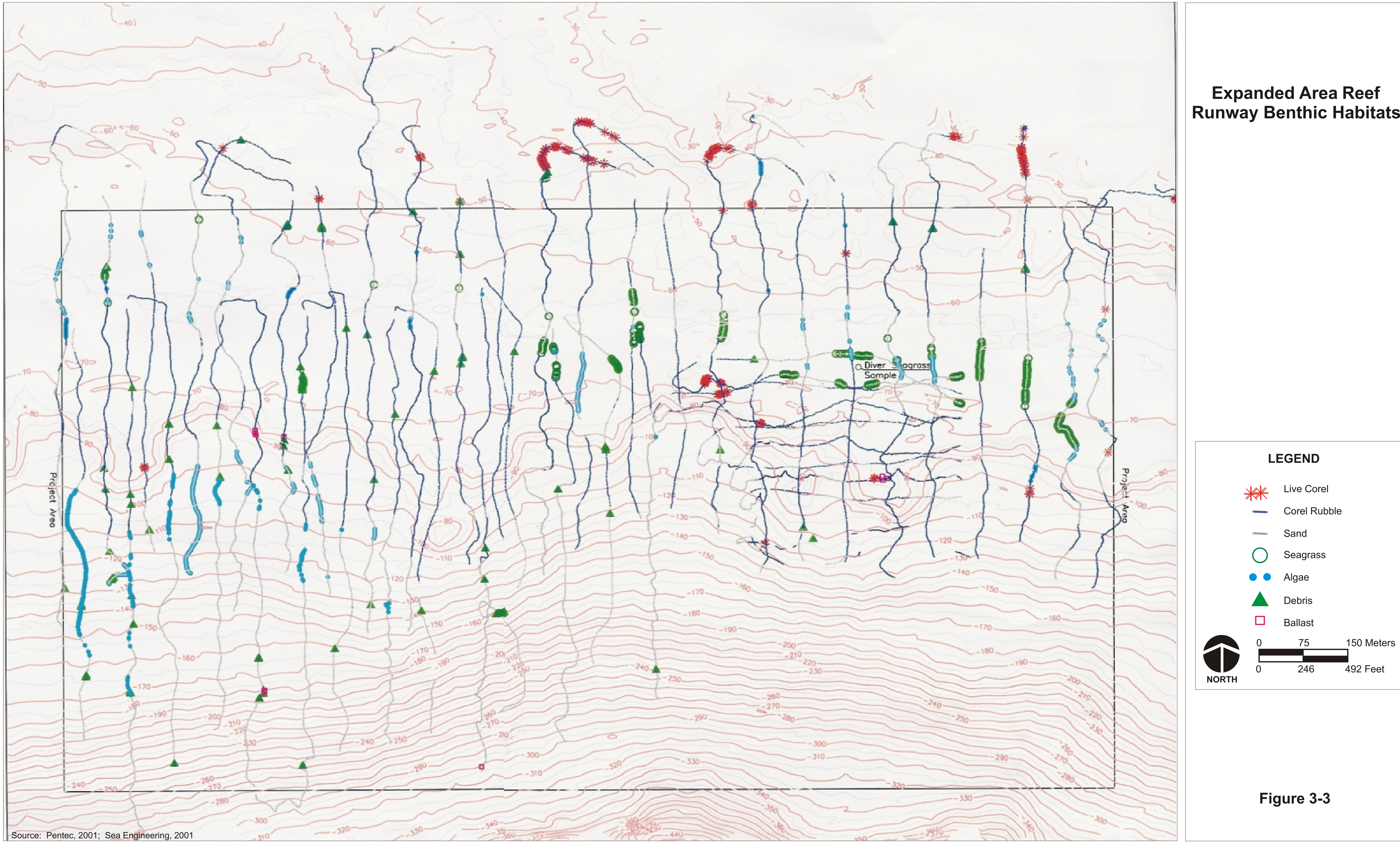


Figure 3-3

At depths of 100 feet (30 meters) and greater, the invertebrate fauna associated with the sand-veneered limestone terrace is dominated by the black sea urchin (*Diadema paucispinum*). Unidentified black sea cucumbers (*Holothuria* spp.) were also common in rubble or sand patches below a depth of 90 feet (27 meters) (appendix J, part 1). A very dense assemblage of black sea urchins, with densities of an estimated 100 per square meter, occurred in a band at a depth of 70 feet (21 meters). Several crown-of-thorns starfish (*Acanthaster planci)* were also observed on live coral at water depths of 65 to 70 feet (20 to 21 meters).

Seagrass (*Halophila discipiens*) is present in the general vicinity of the site. This species may provide forage for the threatened green sea turtle (appendix J, part 1). A small endemic gastropod (*Smaragdia bryanae*) has been observed on the blades of this seagrass.

At depths between 130 and 170 feet (40 and 52 meters) the seaward reef slope is dominated by sand, algae patches, scattered rubble, and rarely, live coral. Corals at this depth are uncommon because of limited sunlight and lack of hard substrates necessary for coral larval attachment. Corals are limited to an occasional cauliflower coral or bracket-forming *Montipora* spp. The deepest live coral recorded in the vicinity of the Reed Runway shallow-water recovery area was a single bracket-forming *Montipora* spp. colony that was observed at a depth of 165 feet (50 meters). Fish are also uncommon at depths between 130 and 170 feet (40 and 62 meters) because of the lack of live coral and limestone rubble habitats. Fishes recorded in this zone included various acanthurids (surgeonfishes), pomacentrids (damselfishes), balistids (triggerfishes), and labrids (wrasses). The Hawaiian dascyllus is the most common fish associated with live coral colonies at these depths.

A tube-dwelling, mound-building, nocturnal terebellid (family Terebellidae) polychaete worm dominates the infauna at water depths between 170 and 260 feet (52 and 79 meters). Although individual worms were not observed during diurnal surveys, the presence of this polychaete is conspicuous in the form of tentacle tracks in bottom sediments that radiate out from an elevated cone in a spoke-like pattern. Worm densities typically averaged 1 to 3 per square meter.

Fish were generally absent between waters depths of 170 and 260 feet (52 and 79 meters), though a mixed assemblage of *Zanclus cornutus* (moorish idol) and *Chaetodon fremblii* (bluestripe butterflyfish) were recorded at a depth of 170 feet. A single adult barracuda (*Sphyraena barracuda*) was recorded at a depth of 230 feet.

The Reef Runway shallow-water recovery site is within the EFH area for bottomfish management unit species, including eggs, larvae, juveniles, and adult bottomfish. The site is not within the habitat areas of particular concern because of the site's shallower water depths.

The Western Pacific Regional Fishery Management Council has adopted an approximately 3,300-foot (1,000-meter) depth as a lower boundary of the EFH for pelagic management unit species area, and approximately 660 feet (200 meters) from the shoreline to the outer limit of the EEZ as the upper limit of the EFH covering the eggs and larvae of the pelagic management unit species. The Reef Runway shallow-water recovery site would be in this EFH.

Black, pink, gold, and bamboo corals, collectively referred to as precious corals, occur in deep inter-island channels and off promontories at depths between 50 and 4,920 feet (15 and 1,500 meters). These coral species are included as management unit species in the Precious Coral Fisheries Management Plan. No known major precious coral beds are located in the ROI for the site.

The Western Pacific Regional Fishery Management Council has designated EFH for spiny lobster larvae as the water column from the shoreline to the outer limit of the EEZ down to a depth of 450 feet (150 meters). The EFH for juvenile and adult spiny lobster is designated as the bottom habitat from the shoreline to a depth of 330 feet (100 meters). Therefore, the Reef Runway shallow-water recovery site is within the EFH for crustacean management unit species. The Council has also designated all banks in the Northwestern Hawaiian Islands with summits less than 95 feet (30 meters) as habitat areas of particular concern for juvenile spiny lobster. The site is not within one of these areas.

Marine Mammals

A variety of marine mammals could be expected to occur in the Reef Runway shallow-water recovery site ROI. The more common ones would be those species that use the shallower marine waters of the Hawaiian Islands, namely the spinner, spotted, and bottlenose dolphins. These marine mammals are described below.

Hawaiian Spinner Dolphins

In Hawaii, spinner dolphins (*Stenella longirostris*) are the most abundant species of marine mammal sighted in shallow waters of less than approximately 660 feet (200 meters) (Mobley, 1997). Spinner dolphins generally occur in large groups of 20 to 100 animals. They forage almost exclusively at night on a mesopelagic community of prey that moves vertically and horizontally along the slopes of the islands on a nightly basis (Bird and Au, in press). Feeding usually begins in the early evening hours and continues until shortly after dawn on the following day (Norris et al., 1994). Daytime spinner dolphin behavior is characterized by periods of social activity and travel in the early morning and late afternoon hours, and resting behavior during the middle of the day. Most daytime activities are restricted to shallow waters less than approximately 131 feet (40 meters) deep.

Spinner dolphins are known to occur with regularity in waters adjacent to the Reef Runway. A recent survey effort conducted along the Ewa/Honolulu coast reported sightings of spinner dolphins on 67 percent of surveys (Lammers et al., 2000). All spinner dolphin groups that occur in this area exhibited a general tendency to travel from west to east over the course of the day. This pattern reflects a general daytime preference by spinner dolphins in Hawaii for waters protected from the predominant trade winds. The movements observed suggest that spinner dolphins may forage near Barbers Point at night and then move towards the leeward waters off Diamond Head to rest during the day.

Spinner dolphin groups tracked visually often spent several hours in the shallow waters off the Reef Runway. More than 70 spinner dolphins have been observed to remain directly in front of the airport for over 3 hours. A similar pattern was observed on three other occasions (out of six tracks) (Lammers, unpublished data).

Spotted Dolphins

Pantropical spotted dolphins (*Stenella attenuata*) are the second most commonly sighted species of dolphin in Hawaii (Mobley, 1997). Like the spinner, spotted dolphins normally occur in large groups of 15 to 100-plus animals. Spotted dolphins are generally considered to be daytime foragers (Norris and Dohl, 1980), but have recently also been observed feeding at night (Robin Baird, personal communication). Unlike the spinner, spotted dolphins are not known to occur with regularity in shallow waters less than 600 feet (200 meters) deep.

Recent line-transect vessel surveys conducted off the Ewa/Honolulu coast as well as the Barbers Point area yielded only four sightings of spotted dolphins over a total effort of more than 30 surveys (Lammers et al., 2000; Lammers, unpublished data). All sightings were of animals traveling in deep (greater than approximately 660 feet [200 meters]) water or presumably foraging along the steep slopes of the Barbers Point bank. Spotted dolphins do sometimes associate with resting groups of spinner dolphins in other parts of the world (Perrin and Hohn, 1994), but such associations are relatively rare in Hawaii and have not been observed with regularity along the south and west shores of Oahu.

Bottlenose Dolphins

Bottlenose dolphins (*Tursiops truncatus*) have a varied distribution in Hawaii, occurring with regularity in both deep (greater than approximately 660 feet [200 meters], 67 percent) and shallow (less than approximately 660 feet [200 meters], 33 percent) waters (Mobley, 1997). The diet of bottlenose dolphins consists of a variety of fish, squid, shrimp, and crab. This variety in diet is probably responsible for their mixed dispersal pattern. Generally, bottlenose dolphins occur in small groups of 1 to 15 animals, although much larger aggregations are not uncommon. A recent survey effort along the Ewa/Honolulu coast reported six bottlenose dolphin sightings on 19 surveys (a 32 percent encounter rate) (Lammers et al., 2000). Of these, one was in waters deeper than 600 feet (200 meters), one in waters between 300 and 600 feet (100 and 200 meter) and four occurred in waters less than 60 feet (20 meters) deep. Two of these sightings were made within 1 nautical mile (2 kilometers) of the Reef Runway shallow-water recovery site.

Migratory Birds

The Reef Runway shallow-water recovery site is within the potential foraging range of many of the seabird species. The foraging range of some of these species is estimated to be between 98 and 300 miles (approximately 160 and 480 kilometers). Seabirds (e.g., red-footed boobies, masked boobies, white-tailed tropicbirds, red-tailed tropicbirds, sooty terns, brown noddies, and others from the colonies located at Kaula, Niihau, Kauai, and Oahu may be observed foraging in the coastal pelagic waters that surround all of these islands. Common shorebirds in the area of the Reef Runway shallow-water recovery site include the Pacific golden plover *Pluvialis fulva*), ruddy turnstone (*Arenaria interpres*), sanderling (*Calidris alba*), and the wandering tattler (*Heteroscelus incanus*). The black-bellied plover (*Pluvialis squatarola*) may also use the Reef Runway shallow-water area.

Threatened and Endangered Species

The threatened green sea turtle is a common forager along the Ewa to Waikiki coastline. There is some seagrass that may be used by the sea turtle in the vicinity of the Reef Runway shallow-water recovery site. A single adult green sea turtle was observed on May 19, 2001 resting on the bottom in 70 feet (21 meters) of water within the Reef Runway shallow-water recovery site. A number of green sea turtles are known to use the Pearl Harbor Channel in the area of the Fort Kamehameha sewer outfall pipeline as a resting place. Occurrence of the endangered hawksbill turtle is uncommon in the near-shore areas.

While the humpback whale may come into the outer waters of the ROI during the winter months, they will have left the area in June due to the annual northward migration. The endangered sperm whale, blue whale, fin whale, and Hawaiian monk seal would not be expected to occur in the vicinity of the Reef Runway shallow-water recovery site. The ROI would extend about 1 nautical mile (2 kilometers) seaward of the site and may be shallower than the preferred depths of the sperm whale. Sperm whales almost never occur in shallow waters. Hawaiian monk seals, while seen in the area once in 1978, are extremely rare in that area. Blue whales and fin whales are extremely rare in Hawaiian waters. The Hawaiian monk seal would not be expected to use the edges of the Reef Runway as a haul out area.

Three seabird species that occur in the Hawaiian Islands and may occur in the area of the Proposed Action are on the U.S. Fish and Wildlife Service list of threatened and endangered wildlife. The endangered short-tailed albatross is expected to forage in the ROI. Another species that could forage in the ROI of the Reef Runway shallow-water recovery site is the Hawaiian petrel, an endangered species. One other species, the Newell’s shearwater, is listed as threatened and could also forage in the site ROI. The latter two listed species breed in Hawaii.

The endangered Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*) is known to occur in Pearl Harbor on mud flats near Fort Kamehameha, and in Keehi Lagoon to the east of the site. The endangered Hawaiian coot (*Fulica alai*) may also occur in the more brackish areas.

3.2.4 TRANSIT ROUTE TO THE DEEP-WATER RELOCATION SITE

From a marine biological resources perspective, the affected environment is essentially identical to that described in section 3.2.2.

3.2.5 DEEP-WATER RELOCATION SITE

Marine Fish, Essential Fish Habitat, and Coral

The deep-water relocation site is located in the pelagic management unit species EFH area. Black, pink, gold, and bamboo corals, collectively referred to as precious corals, occur in deep inter-island channels and off promontories at depths between 50 and 4,920 feet (15 and 1,500 meters). These corals are included as management unit species in the Precious Corals Fisheries Management Plan. The known locations of major precious coral beds are not in the ROI for the deep-water relocation site. No other EFH area is in the vicinity of the deep-water relocation site.

Marine Mammals

The probability of the presence of protected marine mammals in the deep-water relocation site ROI is low. Aerial surveys for marine mammals conducted between 1993 and 1998 within the 1,000-fathom (6,000-foot or approximately 1,800-meter) isobath around the Hawaiian Islands, sighted the following species of odontocete dolphins and whales in the area around the Hawaiian Islands: striped dolphin, spotted dolphin, spinner dolphin, rough toothed dolphin, bottlenosed dolphin, Risso's dolphin, short finned pilot whale, false killer whale, melon-headed whale, and various beaked whales (Mobley et al., 2000). None of these species were sighted in the area of the deep-water relocation site. The probability of sighting the Hawaiian spinner dolphin decreases as the depth increases.

Migratory Birds

The deep-water relocation site is within the potential foraging range of a number of seabird species. The foraging range of some of these species is estimated to be between 98 and 300 miles (160 and 480 kilometers). Seabirds (e.g., red-footed boobies, masked boobies, white-tailed tropicbirds, red-tailed tropicbirds, sooty terns, brown noddies, and others from the colonies located at Kaula, Niihau, Kauai, and Oahu may be observed foraging in the coastal pelagic waters that surround all of these islands.

Threatened and Endangered Species

The occurrence of threatened or endangered marine mammals at the deep-water relocation site is quite low. The humpback whales would not be expected to be in the area, because they would have migrated to their northern feeding grounds. Blue whales and fin whales are extremely rare in Hawaiian waters. The endangered Hawaiian monk seal would only be in the area as transients between islands, and the sperm whale would be expected only in the deeper areas of the deep-water relocation site ROI.

As with the current location, green and hawksbill sea turtles could transit the area, but there is no foraging or resting habitat in the deep-water relocation site ROI.

Three seabird species that occur in the Hawaiian Islands may occur in the area of the deep-water relocation site ROI. The endangered short-tailed albatross is expected to forage in the ROI. Another species is the Hawaiian petrel, an endangered species. One other species, the Newell's shearwater, is listed as threatened and could also forage in the deep-water relocation site ROI. The latter two listed species breed in Hawaii.

3.3 HEALTH AND SAFETY

Health and safety issues associated with underwater recovery operations include worksite and diver safety, diving and boating mishaps, weather, control of public access, damage to public recreation areas, and risks of diesel fuel and lubricating oil release.

Region of Influence

The ROI for health and safety includes the area immediately around the current location, the transit route to the shallow-water recovery site, the shallow-water recovery site itself, the transit corridor to the deep-water relocation site, and the deep-water relocation site. In addition, any shore area that could potentially be impacted by the release of diesel fuel and lubricating oil is included. The ROI also includes the airspace above all of the sites identified. The ROI for airspace is identified in section 3.5.

Health and Safety Environment

The Navy Supervisor of Salvage and Clean Islands Council maintains a Site Safety and Health Plan focusing on the protection of personnel from serious risks to their physical safety and health while responding to a marine discharge. The Hawaiian Area Contingency Plan identifies health and appropriate personnel protective equipment requirements essential for worker safety. The Plan also identifies site control and security requirements, along with site characterization and monitoring requirements. There are standard procedures for reporting medical and fire emergencies, including a medical plan that identifies nearby hospitals and clinics.

Hospitals capable of responding to health and safety issues include Queens Medical Center and Kuakini Hospital in downtown Honolulu, and Airport Urgent Care at Honolulu International Airport. A Safety Officer, field operators, and group supervisors are identified in the Site Safety and Health Plan. For divers, close-by decompression chambers are at Pearl Harbor, and a public decompression chamber is at Kuakini Hospital.

The operational phase of a diesel fuel and lubricating oil release is often characterized by changing conditions at or near the release site. Accordingly, responders are trained to recognize and monitor hazard conditions and implement standard operating procedures and response strategies to protect themselves while effectively responding to the emergency.

Hazardous weather conditions could pose a safety hazard. The National Weather Service and the Navy Meteorological Office at Pearl Harbor are the primary sources for obtaining weather information. Adverse weather conditions include high wind and sea conditions and hurricanes.

Public Safety

This section provides an overview of the existing activities that could affect public health and safety. Additionally, those public recreational areas at risk from a mishap in the ROI are identified.

There are a large variety of ocean and coastal activities in the nearshore and offshore waters of the Hawaiian Islands. These activities include commercial ship traffic (container ships, tugs, barges, and tour vessels), recreational boating (sailboats and motorboats), recreational and commercial fishing, swimming, board and body surfing, scuba diving, shell collecting, and aquarium fish collecting. There are a large number of public recreation areas and natural resource management areas (state parks, wildlife reserves, etc.) along Hawaii's coastal areas. These areas draw visitors from all over the world and are a driving force behind the state's economy. In addition, the nearshore and coastal waters are highly productive areas for the commercial fishing industry. Thus, Hawaiian waters and shorelines have an unusually high level of environmental and economic sensitivity. Generally, nearshore and offshore areas are open to commercial and recreational users at all times and are not restricted. Presently, the only nearshore and offshore waters on Oahu that are off limits to public access are those areas surrounding DoD facilities (e.g., Pearl Harbor and Kaneohe Bay). The U.S. Coast Guard enforces sea surface security outside the Naval Defense Sea Area. Special activities that might result in the temporary restriction of access into otherwise open waters are promulgated through a weekly NOTMAR. Security within the Naval Defense Sea Area is maintained by the U.S. Navy.

Existing public health and safety risks in the ROI are associated with recreational activities, commercial boating, and potential hazardous materials release from shipping and industrial activities. Hazardous materials releases are managed in accordance with appropriate federal, state, and local regulations.

The existing shoreline near the shallow-water recovery site has existing waste water outfalls and petroleum product off-loading facilities at designated anchorage areas.

Diver Safety

The U.S. Navy conducts diving activities in accordance with *The U.S. Navy Diving Manual*. This manual provides the latest procedures and equipment for conducting safe diving activities. *The U.S. Navy Diving Manual* identifies the required equipment and procedures for conducting underwater construction and salvage using surface-supplied diving equipment as well as the requirements for emergency gas supply equipment that is used for enclosed space diving. (U.S. Navy, 1999)

3.3.1 CURRENT LOCATION

The current location is an open-ocean area within U.S. territorial waters. It is not a restricted use area. The primary activities in this area are commercial and recreational fishing. There are no existing public health and safety concerns in this ROI.

3.3.2 TRANSIT ROUTE TO THE SHALLOW-WATER RECOVERY SITE

The transit route ROI would be entirely within U.S. territorial waters. Ocean activities occurring within the ROI along this transit route are commercial and recreational fishing until near-shore waters are reached, where the activities become more oriented towards coastal recreation. There are no known existing public health and safety concerns in this ROI.

3.3.3 REEF RUNWAY SHALLOW-WATER RECOVERY SITE

To minimize public safety concerns, the Naval Defense Sea Area was established by Executive Order 8143 to prohibit civilian watercraft within Pearl Harbor and the area immediately surrounding the entrance to Pearl Harbor unless authorized by the U.S. Navy. The Reef Runway shallow-water recovery site lies entirely within the Naval Defense Sea Area.

Because the U.S. Navy has jurisdiction over the Naval Defense Sea Area, the Pearl Harbor Entrance Channel and Hickam Harbor are restricted to vessels owned and operated by military and DoD personnel. Several commercial fishing and tour boats have been authorized to operate in the Pearl Harbor vicinity. Civilian watercraft are not allowed inshore of the Reef Runway. (U.S. Navy, 2001)

Ocean and nearshore activities occurring in the ROI of the shallow-water recovery site include personal consumptive, commercial, and recreational undertakings. Such activities as net fishing, pole and line fishing, tropical fish collecting, surfing, scuba diving, paddling, kayaking, and shelling occur in this area. Sand Island State Park is about 2.6 nautical miles (4.75 kilometers) to the east, and recreational boating occurs at Kalihi Channel, 1.75 nautical miles (3.2 kilometers) to the east (U.S. Department of the Interior, 1998a). An existing finfish (moi) aquaculture operation is located west of the Pearl Harbor channel about 120 feet (37 meters) deep. A proposed aquaculture farm is 0.75 nautical miles (1.4 kilometers) northeast on the inshore side of the reef along the east and south edges of the runway. (Naughton, 2001) DoD personnel, their family members, and guests may fish recreationally in certain Navy-owned and Air Force-owned areas without a fishing pass. (U.S. Navy, 2001)

3.3.4 TRANSIT ROUTE TO THE DEEP-WATER RELOCATION SITE

Ocean activities occurring within the transit route corridor ROI are commercial and recreational fishing. There are no known public health and safety concerns in this ROI.

3.3.5 DEEP-WATER RELOCATION SITE

The deep-water relocation site lies outside U.S. territorial waters. The water is 6,000 feet (1,800 meters) or more in depth. Ocean activities occurring within the ROI include commercial and recreational fishing. There are no known public health and safety concerns in this ROI.

3.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTES

The affected environment for hazardous materials and hazardous waste includes the sensitive resource areas that could potentially be affected by an unplanned release of diesel fuel or lubricating oil, and any existing hazardous waste areas that may occur in the ROI.

Two existing organizations have the capability to respond to releases of petroleum products. They are the U.S. Navy Emergency Ship Salvage Material (ESSM) and the Clean Islands Council.

The ESSM system on Hickam Air Force Base, Hawaii, is part of a worldwide network of warehouses that stores and maintains a significant stockpile of oil pollution abatement equipment. The ESSM system pollution abatement equipment includes open ocean boom and skimming systems, specialized inland response systems, floating storage, and offload systems.

All equipment is available for immediate deployment and is available to all federal agencies. Equipment is capable of containment and recovery of many grades of refined and crude oils, including heavy residual oils, and marine and jet fuels. The ESSM system includes a range of equipment as listed in table 3-5. (U.S. Navy, 2001c)

Table 3-5: ESSM System Equipment

Released Oil Recovery	Casualty Off-Loading	Ancillary Support Equipment
Containment booms	Oil transfer pumps and hoses	Personnel support vans
Open-ocean skimmers	Floating hose systems	Maintenance vans
Small skimmers	Hot tap systems	Support vessels
In-situ burning equipment	Portable generators	Cleaning equipment
Sorbent materials	Portable fire-fighting pumps	Command vans
Vacuum recovery systems	Hydraulic power packs	Communications systems
Floating storage bladders	Salvage equipment	Small boats All-terrain vehicles Material handling equipment

Source: U.S. Navy, 2001c

The Clean Islands Council is a consortium of regular and associated members working together with the entire Hawaii community to foster, train, and demonstrate safe work practices related to responding to an oil spill. The Hawaii Area Committee is an oil spill preparedness and planning body made up of industry, federal, state, and local agency representatives including the Clean Islands Council. The federal OSC coordinates the activities of the Area Committee and assists in the development of a comprehensive Area Contingency Plan that is consistent with the National Contingency Plan.

The Hawaii Area Contingency Plan provides guidance in the preparation of a proper Site Safety and Health Plan for all IAPs related to oil spills. During a spill event the Clean Islands Council Spill Response Operations Center is essentially a well-outfitted strategic and tactical response management center. Communications include 35 phone lines, 9 fax machines, 2 Local Area Networks, radio and internet capability, as well as video and digital imagery capability. (Clean Islands Council, 2001)

The Honolulu Area Planning Committee has been working to define Geographical Response Strategies that should serve in most cases as the “first strike” move to protect the environment from an accidental release of oil. Most existing Geographical Response Strategies are designed around “first strike” immediate containment of oil at identified transfer points or other areas that are the more probable spill locations. Much of the Clean Islands Council's equipment is deployed in accordance with these well-proven strategies. Training in the strategies and the deployment of equipment usually occurs twice a year. Companies are well practiced in immediate response.

Additional Geographical Response Strategies are currently being developed within the Shoreline subcommittee of the Honolulu Area Planning Committee to address additional strategies to protect sensitive areas along Hawaii's coastlines.

Equipment

The U.S. Navy Supervisor of Salvage recovery capability is 57,000 gallons (approximately 215,800 liters) per day. The Clean Islands Council has equipment capable of recovering approximately 62,000 gallons (approximately 235,000 liters) of oil per day. The response equipment includes vessels and skiffs, skimmers, pumps and skimmer accessories, containment equipment, and booms and other equipment packages, all of which are available (table 3-6). In the unlikely event they should be required, dispersants would also be available. Since 1997 the Hawaiian Area Planning Committee, along with the State of Hawaii, the U.S. Coast Guard, and the Clean Islands Council, have worked together to further enhance their dispersant application capabilities. The current dispersant capacity is 37,260 gallons (approximately 141,000 liters) of Corexit 9500, which can be applied by two 242-gallon (920-liter) helicopter application buckets, one oil release response vessel with twin 40-foot spray arms and capable of traveling at speeds of 10 knots, and another 5,000-gallon (approximately 19,000-liter) system. (Clean Islands Council, 2001)

There are no known hazardous waste or material disposal sites, or Installation Restoration Program sites near any of the sites or locations in the ROI.

Region of Influence

The areas potentially affected by the Proposed Action include the seafloor, the ocean surface, and the beaches and reefs around the Proposed Action sites, discussed below, particularly the shallow-water recovery site.

Table 3-6: Available Response Equipment

Skimmers	Pumps And Skimmer Accessories	Containment	Boom	Vessels and Skiffs	Packages
Diesel Powered Peristaltic Hose Pump With Skim Pack 4200 Package With Hoses (3)	Pneumatic Double Diaphragm Pumps W/Hose (3)	20,000-gallon Storage Bladder (4)	Spectrum Trailer With 1,000-foot 8 by 12 Inch Acme Boom (3)	10-foot Under Pier Skiff with Oars	Large Personnel Zone Control/Decon Station (3)
Oela Four Float Weir Skimmers (3)	Gas Single Diaphragm Pump	5-cubic-meter Ro-Tank - Tsbs	1,800 Feet of 42-inch Expandi Boom	9-foot Under Pier Skiff with Oars	Large Fishtote Workvest Pack 50 Sets (2)
GT 185 Ocean Skimmer With ASI 16TSO Power Pack, Hoses, and Hyd. Control Table (2)	Karcher Steam Pressure Washer	2,500-gallon Fast Tanks (4)	180 Feet of 42-inch Troil Boom	8-foot Under Pier Skiff with Paddle	Ppe Overpack 50 Sets (3)
Mini Walosep	Acme Floating Circulation Pump		100 Feet of 44-inch Troil Boom	24-foot Pontoon Boat with O/B	Arge Heat Stress Shade Station (2)
Slickbar Slurp Wier	Acme Floating Washdown Pump			17-foot Boom Boat with O/B	Multi Person Hand Washing Basin
Oil Mop OMI 1-4D				15- foot Boston Whaler with O/B	Foss 25 by 50 foot Large Decon Pool
Oil Mop OMI 11-4D Trailer Mounted				15- foot Fiberglass Under Pier Boat with O/B	Small Personnel Decon Station (5)
Oil Mop OMI 11-9D					Shoreline Cleanup Tools Package
Aquaguard Rbs-10 Brush/Disc/Drum Skimmer with 24-Foot Aqua Cat Vessel					Versitek API Separator (4)
Lori 4 Brush Side Mounted Skimmer with DOP 250 Pump Package					Skid Mounted Fiberglass 2500 Gallon API Separator
					Diesel Powered Light Trailer

Source: Clean Islands Council, 2001.

3.4.1 CURRENT LOCATION

Of the original 65,000 gallons (approximately 246,000 liters) on board, post-collision estimates indicated that up to 60,000 gallons (up to 227,000 liters) of diesel fuel were released from *Ehime Maru* after the incident (see chapter 2).

Approximately 1,200 gallons (4,540 liters) of more persistent lubricating oil and 46 gallons (182 liters) of kerosene were present at the time of the accident. This lubricating oil displays some toxic characteristics. It is not known how much lubricating oil is still present on *Ehime Maru*. Other hazardous materials that may have been on board *Ehime Maru* include hydraulic oil, refrigerants, paint, and solvents. Water quality conditions are addressed in section 3.1.1.

3.4.2 TRANSIT ROUTE TO THE SHALLOW-WATER RECOVERY SITE

There are no known hazardous materials and hazardous wastes present in the transit route corridor. Water quality conditions are addressed in section 3.1.2.

3.4.3 REEF RUNWAY SHALLOW-WATER RECOVERY SITE

This section provides an overview of potential hazardous wastes in the vicinity of the shallow-water recovery site. Sensitive public and commercial resources near the site are described in section 3.3 (Health and Safety).

Unexploded ordnance may be found at the Reef Runway shallow-water recovery site. Unexploded ordnance was found on three occasions during the construction of the Reef Runway (1973 through 1977). There are no other known hazardous materials and hazardous wastes present at the site. Water quality conditions are addressed in section 3.1.3.

3.4.4 TRANSIT ROUTE TO DEEP-WATER RELOCATION SITE

There are no known hazardous materials and hazardous wastes present in the transit route corridor to the deep-water relocation site. The South Oahu Ocean Dredged Material Disposal Site (ODO912) is the only active dredged material disposal site in Mamala Bay and services Pearl, Honolulu, and Barbers Point harbors. The site has been receiving dredged material since its designation by the U.S. Environmental Protection Agency in 1980. Approximately 12 million cubic yards (9.2 million cubic meters) of sediments have been generated by harbor dredging projects from 1959 through 1994. The deposited material within the site is primarily silt/clays mixed with coarse carbonate rubble. These deposits have been clearly delineated by sidescan sonar and video by a U.S. Environmental Protection Agency/U.S. Army Corps of Engineers monitoring program. Bottom video of this site shows the seafloor is littered with a variety of human-caused debris including military ordnance. Water quality conditions in the transit route corridor are discussed in section 3.1.4.

3.4.5 DEEP-WATER RELOCATION SITE

There are no known hazardous materials and hazardous wastes present at the deep-water relocation site. Water quality conditions at the deep-water relocation site are discussed in section 3.1.5.

3.5 AIRSPACE

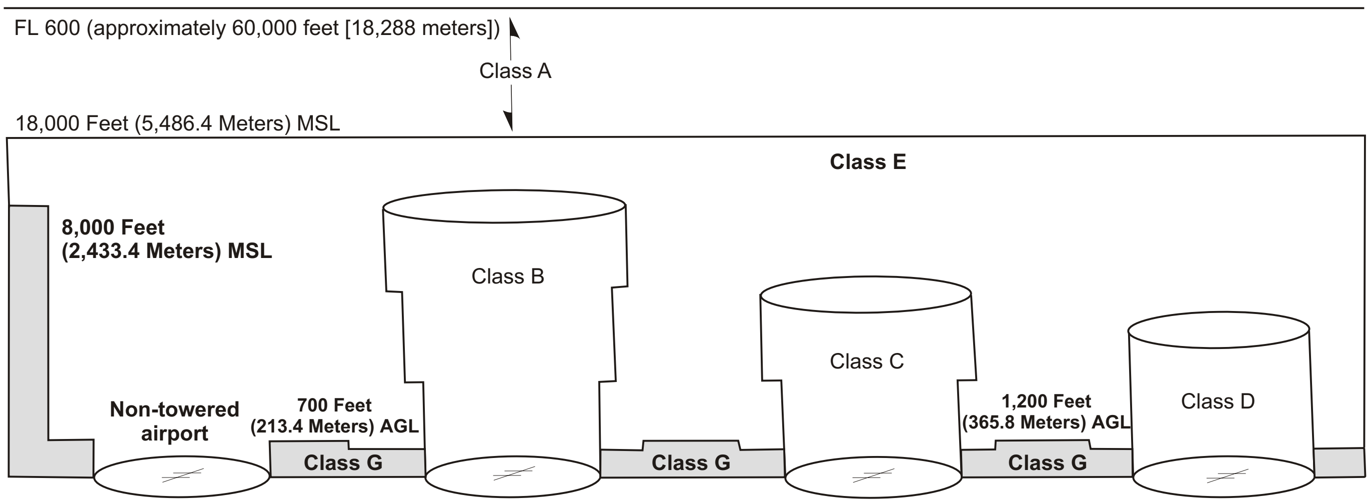
Airspace is generally viewed as being unlimited. However, it is a finite resource that can be defined vertically and horizontally, as well as temporally, when describing its use for aviation purposes. Scheduling is a very important factor in airspace management and air traffic control.

The FAA is charged with the safe and efficient use of the nation's airspace and has established certain criteria and limits to its use. The method used to provide this service is the National Airspace System. This system is " . . . a common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information and manpower and material" (Spence, 2001).

Controlled and uncontrolled airspace is divided into six classes, dependent upon location, use, and degree of control (figure 3-4). These classes are:

- Class A airspace, which is not specifically charted, is generally that airspace from 18,000 feet (5,486 meters) mean sea level up to and including flight level 600 (approximately 60,000 feet or 18,288 meters). Unless otherwise authorized, all aircraft must be operated under instrument flight rules.
- Class B airspace is generally that airspace surrounding the nation's busiest airports in terms of instrument flight rules operations or passenger volume. An air traffic control clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.
- Class C airspace is generally that airspace surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of operations or passengers.
- Class D airspace is generally that airspace surrounding those airports that have an operational control tower.
- Class E airspace is controlled airspace that is not Class, A, Class B, Class C, or Class D airspace.
- Class G, or uncontrolled airspace, has no specific definition but generally refers to airspace not otherwise designated, and operations below 1,200 feet (366 meters) above ground level. No air traffic control service to aircraft operating under either instrument or visual flight rules is provided other than possible traffic advisories when the air traffic control workload permits and radio communications can be established (Illman, 1993).

The distinction between controlled and uncontrolled airspace is important. Within controlled airspace, air traffic control service is provided to aircraft in accordance with the airspace classification. Aircraft operators are also subject to certain pilot qualifications, operating rules, and equipment requirements. Whereas within uncontrolled airspace, no air traffic control service to aircraft is provided other than possible traffic advisories when the air traffic control workload permits and radio communications can be established (Illman, 1993).



Approximate maximum ceilings:
Class B: 8,000 Feet (2,433.4 Meters) AGL
Class C: 4,000 Feet (1,219.2 Meters) AGL
Class D: 2,500 Feet (762 Meters) AGL

Source: Illman, 1993.

LEGEND

AGL = Above Ground Level
FL = Flight Level
MSL = Above Mean Sea Level

Non-Military Airspace Classes

Figure 3-4

No Scale

3_4AirspaceClasses060101

Region of Influence

The general ROI is the airspace within and below the 20-nautical-mile (37-kilometer) radius Class B Airspace associated with Honolulu International Airport on, and off, the south coast of Oahu This general ROI encompasses the current location of *Ehime Maru*, the transit route to the shallow-water recovery site, the shallow-water recovery site, the transit route to the deep-water relocation site, and the deep-water relocation site.

Airspace Use

The overall airspace use environment in the ROI is described below in terms of its principal attributes, which are: controlled and uncontrolled airspace; enroute low-altitude airways; airports and airfields; and air traffic control. Other airspace use attributes, such as special use airspace, military training routes, and high-altitude jet routes, are not relevant here because the jet routes, all above 18,000 feet (5,486 meters), are well above the activities proposed, and because there is no special use airspace, and no military training routes in the ROI. The airspace use over the individual sites associated with the Proposed Action is described in following sections.

Controlled/Uncontrolled Airspace

The ROI is dominated by the Class B airspace that lies above and around Honolulu International Airport. It consists of a "core" surface area that extends from the surface up to 9,000 feet (2,743 meters) above sea level out to a 5-nautical-mile (9-kilometer) radius.

Below the Class B layers, between the 5-nautical-mile (9-kilometer) radius "core" area and 15 nautical miles (28 kilometers) out, is Class E controlled airspace with a floor 700 feet (213 meters) above the surface. This layer of controlled airspace is itself underlain with uncontrolled (Class G) airspace from the surface to 700 feet (213 meters). Further out to 20 nautical miles (37 kilometers), the underlying airspace is also uncontrolled (Class G) airspace, with varying altitudes (see figure 3-4 for details).

Enroute Airways

A number of low altitude enroute airways enter or transect the ROI. These airways are referred to as Class E airspace, established in the form of a corridor. The corridor's centerline is defined by radio navigational aids. They form a network serving aircraft up to, but not including, 18,000 feet (5,486 meters) above sea level. The sections below identify the nearest enroute airways.

Airports and Airfields

Honolulu International Airport and Hickam Air Force Base lie on the northern edge of the airspace use ROI. Honolulu International Airport is Hawaii's principal airport, with approximately 1,000 operations (departures and arrivals) per day in the year 2000 (Schlapak, 2001a). A total of 22.3 million passengers arrived in fiscal year 1999 (Hawaii Department of Transportation, 2001). Figure K-1 in appendix K shows the precision instrument approach zone slopes for both runways at Honolulu International Airport. These show the standard instrument approach procedure flight paths for arriving aircraft.

Figures K-1 through K-8 in appendix K show the various instrument approach patterns for the different runways at the airport. There are no temporary flight restrictions currently used at the airport.

In addition to the fixed-wing operations at Honolulu International Airport, commercial tour operator helicopters account for approximately 30 operations per day. Their normal flight routes hug the coast of Oahu east of the airport toward Makapuu Point. They typically either circle the entire Koolau Range returning to the airport over Kamehameha Highway, down the central part of Oahu to Pearl Harbor and the airport, or fly over the Pali Pass. The U.S. Coast Guard and local fire and ambulance helicopters are also based at the airport (Schlapak, 2001a, b).

Kalaeloa Airport (John Rodgers Field) just east of Barbers Point on the coast west of Honolulu had approximately 440 operations (departures and arrivals) per day in the year 2000, primarily touch-and-go training takeoffs and landings by light-plane pilots, the U.S. Coast Guard, the National Guard, and others (Schlapak, 2001a). Figures K-8 and K-9 in appendix K show the instrument approach patterns for the airport.

Air Traffic Control

The Honolulu Control Facility manages air traffic in the ROI within the U.S. territorial waters. The airspace beyond these territorial waters is in international airspace; therefore, the procedures of the International Civil Aviation Organization are followed (International Civil Aviation Organization, 1985, 1994). The FAA acts as the United States agent for aeronautical information to the International Civil Aviation Organization, and the Honolulu Control Facility and the Oakland Air Route Traffic Control Center manage air traffic in the ROI.

3.5.1 CURRENT LOCATION

The immediate airspace use ROI is a 3-nautical mile (5.5-kilometer) radius area covering the current location of *Ehime Maru*. The sections below highlight any differences with the general ROI airspace use description provided above, particularly the specific nature of the overlying controlled/uncontrolled airspace, and the nearest enroute low altitude airways.

Controlled/Uncontrolled Airspace

The airspace above the current location is uncontrolled airspace from the surface to 700 feet (213 meters) above sea level, and controlled (Class E and B) airspace above that (figure 3-4).

Pilots in uncontrolled (Class G) airspace have the responsibility to see and avoid other aircraft when flying and are required to remain at least 1,000 feet (305 meters) above the highest obstacle within a horizontal distance of 4 nautical miles (7.4 kilometers) from the course to be flown under certain FAA flight rule requirements. Pilots in the controlled (Class E) airspace immediately above the uncontrolled airspace have no specific arrival or through flight entry requirements. However, an air traffic control clearance is required for all aircraft to operate in the Class B (controlled) airspace from 1,000 to 9,000 feet (305 to 2,743 meters) above sea level. All aircraft that are cleared receive separation services within the airspace. (Spence, 2001)

Enroute Airways

Two low altitude enroute airways enter or transect the ROI: V2 between Oahu and Lanai, and V20 between Oahu and Kona on the island of Hawaii.

3.5.2 TRANSIT ROUTE TO THE SHALLOW-WATER RECOVERY SITE

The sections below highlight the details of the overall general airspace use ROI described above, particularly the specific nature of the overlying controlled/uncontrolled airspace and the nearest enroute low altitude airways.

Controlled/Uncontrolled Airspace

The transit route between the current location and the shallow-water recovery site lies under two separate layers of Class B airspace, with two distinct altitude floors (U.S. Department of Transportation, 2000). Between the current location and 5 nautical miles (9.3 kilometers) from Honolulu International Airport, the layer has a floor of 1,500 feet (457 meters) above sea level. Lying under this is another layer of controlled (Class E) airspace and a layer of uncontrolled (Class G) airspace from the surface to 700 feet (213 meters) (figure 3-4).

Enroute Airways

One low altitude airway (V20) lies to the east of the transit route to the shallow-water recovery site. Another airway (V8-21) lies to the west of the transit route.

3.5.3 REEF RUNWAY SHALLOW-WATER RECOVERY SITE

The sections below highlight the details of the overall general ROI airspace use description provided above, particularly the specific nature of the overlying controlled/uncontrolled airspace, and the nearest enroute low altitude airways.

Controlled/Uncontrolled Airspace

The Reef Runway shallow-water recovery site lies under the “core” Class B airspace surrounding Honolulu International Airport. This “core” area of controlled airspace extends out to a 5-nautical mile (9.3-kilometer) radius, with a ceiling of 9,000 feet (2,743 meters) above sea level, and a floor that extends to the surface (U.S. Department of Transportation, 2000).

Enroute Airways

There are no enroute low altitude airways within the airspace immediately above the Reef Runway shallow-water recovery site. Within 5 nautical miles (9.3 kilometers) of Honolulu International Airport, arriving aircraft move from the network of airways serving aircraft operations to start their final approach. Departing aircraft follow departure procedures before they join the network of airways. The site is close to, but well below, the approach zone for one of the runways. The airport's precision instrument approach zone slopes for both runways at Honolulu International Airport are shown in figure K-1 in appendix K.

Airports/Airfields

Honolulu International Airport is immediately to the north of the shallow-water recovery site, which lies just offshore of one of the airport's runways.

3.5.4 TRANSIT ROUTE TO THE DEEP-WATER RELOCATION SITE

The airspace that lies over the transit route to the deep-water relocation site is essentially identical to the airspace described in section 3.5.2. However, the different types of airspace along the transit route are reversed.

3.5.5 DEEP-WATER RELOCATION SITE

Controlled/Uncontrolled Airspace

The airspace use affected environment is identical to that described in section 3.5.1, with the exception that the overlying controlled (Class B) airspace is 1,500 feet (457 meters), not 1,000 feet (305 meters) above sea level (U.S. Department of Transportation, 2000).

Enroute Airways

There is one low altitude enroute airway, V8-21, in the vicinity of the deep-water relocation site.

4.0
ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental consequences of the proposed activities by comparing these activities with the affected environment. The amount of detail presented in each section is proportional to the potential for impacts.

To assess the potential for environmental impacts, a list of activities necessary to accomplish the Proposed Action and the Recovery-not-possible Alternative was first developed (chapter 2.0). Next, the environmental setting was described, with emphasis on any special environmental sensitivity (chapter 3.0). In this chapter the Proposed Action and the Recovery-not-possible Alternative are compared with the potentially affected environment to determine the environmental impacts, if any, of the proposed activities. Proposed activities were also reviewed for the potential for cumulative impacts.

Environmental Resources Eliminated from Detailed Consideration

In terms of air quality, while there would be mobile emissions from ships, barges, spotter planes, and helicopters involved in the operation, there would be no stationary source emissions. Furthermore, there would be no hazardous or toxic air pollutants from stationary emissions not covered by the National Ambient Air Quality Standards but covered under the National Emission Standards for hazardous air pollutants. Terrestrial biological resources would not be affected since all activities would be confined to either deep-water or shallow-water areas off the coast of Oahu. There are no areas of concern for cultural and archaeological resources, historic buildings and structures, or traditional cultural properties. There are no areas of ethnic importance that could be affected (State Historic Preservation Officer, 2001).

Similarly, no impacts to land, geology (local physiography, topography, and geological resources), and soils would occur. There would be no impacts to land use, or any conflicts with land use plans, policies, or controls. There may be some noise associated with the operations, but any noise would be short-term, intermittent, and no different from regular ongoing vessel and aircraft noise in the area. With such a short timeframe for implementation of the Proposed Action, the potential for adverse socioeconomic impacts to income, population, housing, community services, and infrastructure would not exist. No transportation-related impacts to road, rail, air, or water modes would be expected, and the Proposed Action would have no effect on local utilities in terms of their energy, potable water, wastewater or solid waste processing and distribution capacities, storage capacities, average daily consumption, or peak demand loads. Lastly, no permanent change to the existing character of the landscape or scenic viewshed would occur, and thus there would be no impacts to visual and aesthetic resources.

There is, however, the potential for adverse impacts to water quality, marine biological resources including coral reefs, public health and safety, and airspace. In addition, there is the potential for hazardous materials and hazardous waste from proposed activities to affect the environment. These resources are addressed in the following sections.

4.1 WATER QUALITY

This section describes the potential impacts to water quality from hazardous materials that may remain on *Ehime Maru*. To analyze the potential impacts to water quality, it is important to understand the hazardous materials that may remain on *Ehime Maru* and the natural process that could affect these materials.

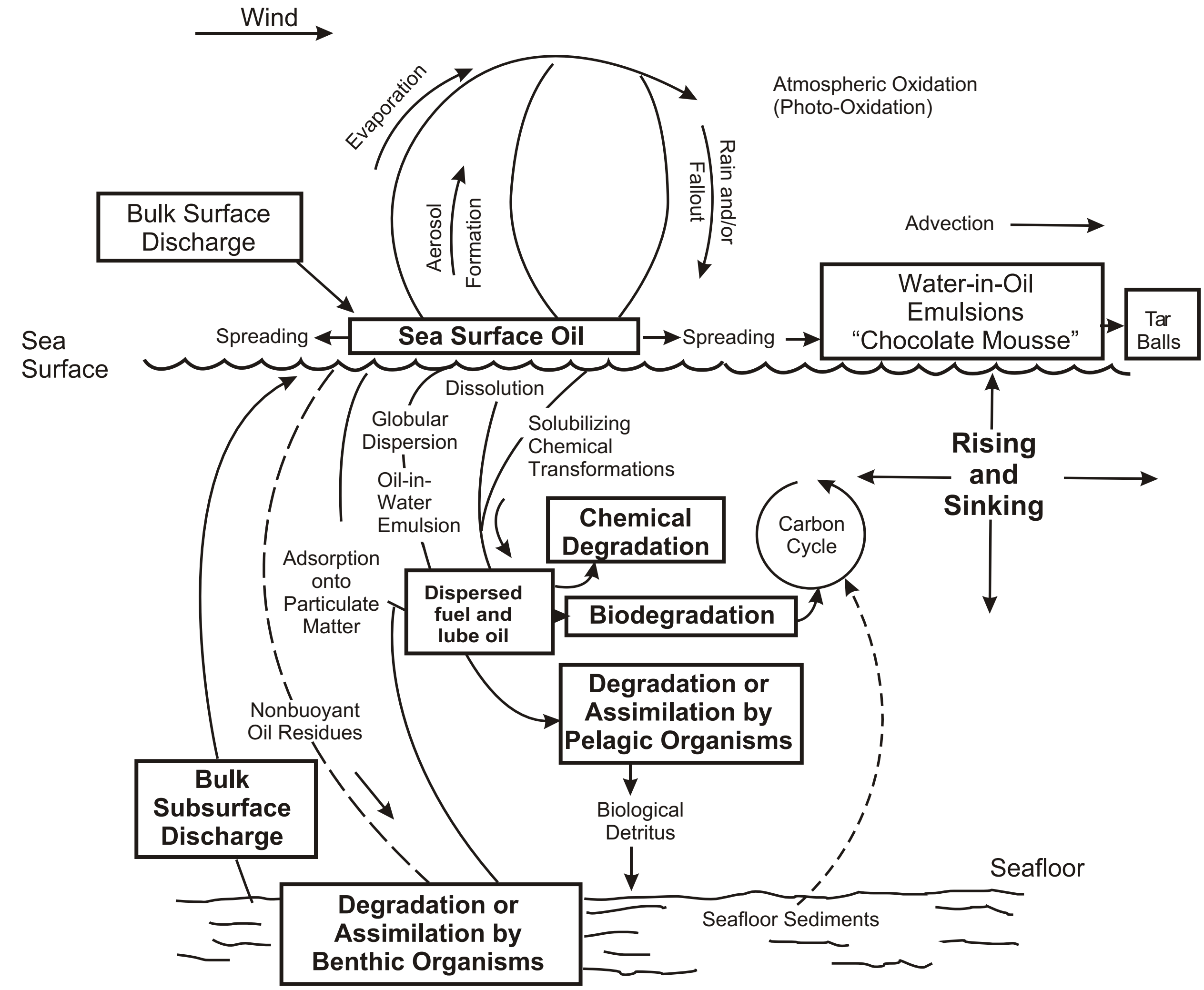
4.1.1 PROPOSED ACTION

Records and personal conversations indicate that at the time of the collision, *Ehime Maru* carried approximately 65,000 gallons (246,000 liters) of diesel fuel, 1,200 gallons (4,500 liters) of lubricating oil, and 46 gallons (182 liters) of kerosene. The ship was also equipped with a carbon dioxide fire extinguishing system, some smaller fire extinguishers of unknown content, and a small hazardous material storage locker. The contents of the locker are unknown, but may have included very small amounts of paints, cleaning solvents, and small quantities of other chemicals.

Because sea water at the current ship location exerts a pressure about 62 times the average pressure at sea level, it is probable that all canisters, aerosol cans, and other containers on board that were not open when the ship submerged have collapsed, releasing their contents. Thus, it is considered likely that all significant quantities of liquids and certain gases onboard were released from the ship during its descent, with the possible exception of remaining petroleum products, primarily diesel fuel and lubricating oil that may have been trapped in compartments within the ship.

Petroleum introduced to the marine environment goes through a variety of physical, chemical, and biological changes during exposure to sea water (figure 4-1). Some of the processes such as evaporation may be responsible for the loss of from one-third to two-thirds of fuel released in a period of hours depending on the size of the release, wind speed, and other factors. Appendix I, part 2, provides more details on the physical, chemical, and biological processes that may change released petroleum.

Baseline water samples would be taken at the shallow-water recovery site prior to operations. Baseline samples would also be taken of the diesel fuel *Ehime Maru* used. Recovery personnel would try to obtain a sample of any remaining diesel fuel or lubricating oil from *Ehime Maru*. In the event of a release, initial and periodic sampling for total hydrocarbons and benzene would be taken.



Source: National Academy Press, 1985, pg. 271

Weathering Processes Affecting Petroleum Products Releases in the Ocean

Figure 4-1

4.1.1.1 Current Location

As stated in section 4.1.1, some liquid and gaseous pollutants on the ship at the time of the collision are very likely to have been released to the water column during the ship's descent. The Proposed Action is judged not to have any measurable effect from liquid or gaseous pollutants originally on board the ship other than petroleum products.

If any remaining petroleum products are released from *Ehime Maru* during mobilization and lifting actions, they could rise to the sea surface. Any diesel fuel or lubricating oil released would be subject to weathering processes. The effect of a diesel fuel or lubricating oil release on water quality is contingent upon a number of factors, including the amount and rate of the release and environmental conditions (e.g., wind, current, sea state) at the time of the release. However, the U.S. Navy would take all reasonable precautions to ensure proposed activities are conducted during favorable sea and wind conditions and would be prepared to contain and remove, to the maximum extent practicable, petroleum on the sea water surface. Therefore, there would be no long-term environmental effect as a result of a petroleum product release during proposed activities at the current location.

The Proposed Action is not expected to measurably alter biologically important parameters of water quality including salinity, temperature, pH, density, and dissolved gases except in the immediate area of such a diesel fuel or lubricating oil release. Potential effects to physical and chemical water quality are judged to be minimal because they would be localized and transitory and would be subject to planned response actions and weathering.

4.1.1.2 Transit to the Shallow-water Recovery Site

Petroleum products are anticipated to be the only pollutants on *Ehime Maru* that are likely to be released in sufficient quantities to result in a measurable water quality effect during transit from the current location to the shallow-water recovery site. Because of this potential, the U.S. Navy has determined that the most likely release scenario would have oil response equipment and a response management team mobilized during the lift and relocation phases, should the need arise. During the transit to the shallow-water recovery site, the heavy-lift vessel would remain at a location approximately 3 nautical miles (approximately 6 kilometers) away from the site to wait for optimal weather conditions and sea state. Transit would only occur during the daylight hours. This would minimize the potential impact from the spread of a diesel fuel or lubricating oil release by allowing immediate detection of any resultant "sheen." Although there would be some short-term degradation in water quality immediately around a release, there would be no long-term environmental effect on water quality after the response operation.

4.1.1.3 Reef Runway Shallow-water Recovery Site

The only significant quantities of water quality pollutants expected to be on *Ehime Maru* during shallow-water recovery operations are petroleum products. Some increase in water turbidity may occur during the placement of *Ehime Maru* on the ocean bottom, installation of the mooring system for the diving barge, and from miscellaneous anchoring from support ships. Sediment at the shallow-water site is primarily sand and coral rubble that would quickly settle to the bottom. Thus, any exceedance of the state water quality criteria for turbidity of Class A marine water would be localized and very short-term; therefore, no adverse impacts to the Class A water quality for turbidity would occur.

As addressed in the Proposed Action, an attempt would be made to remove any remaining petroleum products on the vessel following crewmember recovery. The potentially affected areas from a catastrophic uncontrolled release of a reasonable amount of petroleum products on board the ship were modeled (appendix H). These simulations indicate with a 90 percent confidence level where the maximum surface area of an uncontained diesel fuel or lubricating oil release would be expected to migrate at different time intervals following a release. The actual area would depend on a number of factors including the amount and type of product released (diesel fuel spreads faster, but is more volatile than lubricating oil), the wind direction and strength, tidal cycle, wave height, ocean temperature, and currents at the time of release. However, because of the potential for a release, the U.S. Navy would take all reasonable precautions to ensure that proposed activities are conducted during daylight hours (allowing detection of resultant sheens from diesel fuel or lubricating oil) and during favorable sea and wind conditions and would be prepared to contain and recover petroleum releases.

Therefore, the environmental effect of a petroleum release during proposed activities at the recovery sites would be minimal. Additionally, removal of any petroleum currently remaining on board the ship would have a long-term beneficial effect on marine water quality.

The Reef Runway shallow-water recovery site, because of its proximity to Honolulu Harbor, Keehi Lagoon, Pearl Harbor, and the Sand Island, Honouliuli, and Fort Kamehameha wastewater treatment plant outfalls, is likely to experience temporary degradations in water quality. Nonetheless, the Proposed Action includes procedures and equipment that would be implemented, such as the establishment of booms and skimmer vessels, to minimize the potential for additional water quality impacts. Because of the procedures and equipment that would be in place to respond to any releases, any further reduction of water quality during proposed activities is expected to be minimal and short term.

4.1.1.4 Transit to the Deep-water Relocation Site

No impact on water quality is expected during transit to the deep-water relocation site. An attempt to remove any petroleum product on *Ehime Maru* would be made during shallow-water recovery activities. Therefore, any quantity of petroleum remaining on board during transit would be minimal, sealed within the ship, and not expected to be released to the environment. If during the recovery effort not all of the diesel fuel and lubricating oil is removed, there is the potential for a release similar to the transit to the shallow-water recovery site. However, the equipment and procedures would be in place to respond to such a release. Overall, no diesel fuel or lubricating oil releases would be expected that would measurably degrade existing water quality during transit.

4.1.1.5 Deep-water Relocation Site

Some metals used in ship construction can be toxic to marine life in high concentrations. However, as evidenced by other ships lying in deep-water for long periods of time, the ship materials would decompose at a very slow rate. *Titanic* is a recently photographed example of the slow rate of metal decomposition in the deep ocean environment. Consequently, no short-term effects are anticipated, and any long-term effect on water quality as a result of ship decomposition would be minimal and localized.

There is potential for a diesel fuel or lubricating oil release during deep-water relocation from petroleum products that may remain aboard *Ehime Maru* after removal efforts at the shallow-water recovery site. However, the Navy would take all reasonable precautions to ensure that proposed activities would be conducted during favorable sea and wind conditions. In addition, the Navy would be prepared to contain and remove all reasonably recoverable diesel fuel and lubricating oil on the sea water surface during the release of the ship at the deep-water relocation site.

Once the ship is relocated in deep water, any remaining petroleum product releases would most likely be minimal and at a slow rate following hull decomposition rather than a rapid release. Product released at a slow rate is anticipated to disperse in the water during movement to the sea surface and not form a noticeable release or measurably degrade water quality.

4.1.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, *Ehime Maru* would not be recovered and would remain at its current location. This alternative would not allow for the recovery of potentially remaining hazardous materials that could affect water quality and cause long-term degradation of the marine environment through the continued release of the remaining hazardous materials. However, this alternative would eliminate the potential for a release close to shore because the ship would not be moved.

4.2 MARINE BIOLOGICAL RESOURCES

Biological resources potentially affected by the proposed relocation and recovery actions are evaluated using an approach based on consideration of habitat quality, duration of the impact, quantity of habitat impacted, and susceptibility of the resource to damage.

4.2.1 PROPOSED ACTION

This section analyzes the potential impact to marine biological resources from the Proposed Action. The recovery plan includes measures the Navy would take to minimize impacts to marine biological resources. The appropriate resource agencies would be notified to administer necessary assistance if birds, marine mammals, or sea turtles should come in contact with unanticipated diesel fuel or lubricating oil releases. In accordance with the recovery plan, the U.S. Fish and Wildlife Service would conduct pre-recovery and post-recovery surveys of three areas on Oahu and one on Kauai to identify any oiled birds. In addition, U.S. Fish and Wildlife Service and/or National Marine Fisheries Service personnel would be aboard an oil skimmer to observe and collect any distressed birds that may become oiled during the lift and relocation phase.

If it is possible, oiled birds would be stabilized and delivered to a rehabilitation facility. Notifications would be made to National Marine Fisheries Service should mammals or turtles be oiled. The International Bird Rescue Research Center would be contracted for technical assistance with rescue and rehabilitation of oiled birds.

4.2.1.1 Current Location

Marine Fish, Essential Fish Habitat, and Coral

During the rigging and the lifting action there would be some disturbance of the ocean bottom at the current location of *Ehime Maru*. Drilling beneath *Ehime Maru* with the coiled tube drilling system and jet nozzle assembly, inserting the messenger line under the hull, and rigging of lifting plates would disturb unconsolidated sediments on the seafloor that may provide habitat for bottom dwelling invertebrates and deep-water fishes. Similar disturbances would be expected during the mooring of the coiled tube drilling system and during activities involving the movement of ROV vehicles and ROV umbilical lines on the seafloor. Overall, there would be a limited area that would be subject to disturbance on the seafloor or on marine fish or EFH.

Deep-water lifting of *Ehime Maru* is expected to disturb and re-deposit sand deposits beneath and to either side of the vessel. This action could potentially disturb and/or result in the loss of some bottom-dwelling organisms and result in a small change in the substrate contours in the affected area. Because of the limited area of disturbance, this effect is expected to be minimal.

Ehime Maru is located within the EFH for adult and juvenile pelagic management unit species (Western Pacific Regional Fishery Management Council). The Council has designated the water column down to 3,300 feet (1,000 meters) that is above all seamounts and banks within the EEZ shallower than 6,000 feet (2,000 meters) as a habitat area of particular concern for eggs and larvae of pelagic management unit species. The Proposed Action activities in the current location would not be expected to adversely impact the EFH for pelagic management unit species or any other designated EFH.

The greatest potential for impacts would come with the lifting of *Ehime Maru* from the seafloor if there is any remaining diesel fuel or lubricating oil on board. Releases of diesel fuel or lubricating oil from the vessel could occur as it shifts position and reaches the planned transit height above the seafloor. Any releases of this type would be expected to rise to the surface, spread out, and rapidly evaporate. However, boom systems and skimmer vessels deployed at the lift location on the day of the lift in accordance with the Proposed Action (chapter 2) would contain the diesel fuel and lubricating oil. The countermeasures provided by the Proposed Action would minimize the potential for impacts to marine fish and EFH.

Marine Mammals

The potential for impacts to marine mammals due to an unanticipated release of diesel fuel or lubricating oil during the lifting of *Ehime Maru* is remote. It is unlikely that Hawaiian monk seals would be present in the channel area where the vessel rests. There is evidence that dolphins can identify the presence of diesel fuel or lubricating oil and avoid it (St. Aubins, et al., 1985). It is likely that the migratory humpback whale would have left for its northern feeding grounds. The sperm whale would not be expected in the relatively shallow water off Penguin Bank (2,000 feet [600 meters]) when it apparently prefers deeper waters (6,000 feet [1,800 meters]).

Migratory Birds

Overall potential impacts to migratory birds would be expected to be minimal with the implementation of the Proposed Action (chapter 2).

Threatened and Endangered Species

The threatened green sea turtle may be in the area of the current location only as a transient from one island to another. The endangered hawksbill turtle may also be in Hawaiian waters in very low numbers. Because of the low probability for either of these species to be in the area of the current location at any particular time, the activities of lifting *Ehime Maru* at the current location is expected to have no effect on the green sea turtle or the hawksbill sea turtle.

The endangered humpback whale would have migrated north from Hawaiian waters by the time the lifting of *Ehime Maru* at the current location occurs. There would be no effect on the humpback whale. The endangered sperm whale generally occurs further offshore and in deeper water than the current location. Consequently, there would be no anticipated effect on the sperm whale. Because the blue whale and fin whale are extremely rare in Hawaiian waters, no impact would be expected. The Hawaiian monk seal may only occur in the area of the Proposed Action on a transient basis, if moving from one island to another. The potential that a Hawaiian monk seal would be in the area on the day the vessel would be lifted is very low, and it is expected that there would be no effect on the species.

The endangered Hawaiian petrel and short-tailed albatross, and the threatened Newell's shearwater are expected to forage in the ROI. Hawaiian petrels and Newell's shearwaters may forage in the waters that surround the island of Oahu. The use of light shields to minimize reflection would reduce disorientation of the Newell's shearwater at night during the crew's preparation for the next day's activities.

4.2.1.2 Transit to the Shallow-water Recovery Site

Marine Fish, Essential Fish Habitat, and Coral

The transit corridor to the shallow-water recovery site would traverse the marine ecosystem currently included in the EFH for pelagic management unit species. There is a potential that some diesel fuel or lubricating oil may be released during transit. The presence of boom systems and skimmer vessels would minimize any potential for impacts.

Marine Mammals

The potential for impacts to marine mammals because of a release of diesel fuel or lubricating oil during the transport of *Ehime Maru* along the transit corridor is low. It is unlikely that Hawaiian monk seals would be present in the area where the vessel is offshore. In the areas where the transit corridor is near shore, the presence of a Hawaiian monk seal is a rare occurrence. There is evidence that dolphins can identify the presence of diesel fuel and lubricating oil and avoid it (St. Aubins et al., 1985). The migratory humpback whale would have left for the northern feeding grounds during the time of the transit to the shallow-water recovery site. The sperm whale generally would not be expected in the shallow-water along the transit corridor. Along the transit corridor, sonar on the ROVs would be used to maintain the necessary clearance from the seafloor. The standard ROV sonar generates sound at a frequency of 700 kHz at a power of 60 decibels at 1 micropascal at 1 meter. This level is outside the hearing range of small whales and dolphins, which can only hear up to 100 kHz. The impacts of underwater sound-producing devices to underwater animals are discussed in more detail in section 4.2.1.5. The slow towing speeds (1 knot [approximately 2 kilometers per hour]) would preclude the potential for collision with a free-swimming marine mammal. Overall, there should be no adverse effects to marine mammals.

Migratory Birds

The use of boom systems and skimmer vessels and implementation of the Proposed Action (chapter 2) would further reduce the potential for impacts to migratory birds.

Threatened and Endangered Species

The threatened green sea turtle may appear in the offshore areas of the transit corridor as a transient from one island to another. There is a greater chance for the green sea turtle to be present in the nearshore waters where they forage on algae and seagrasses. Because of their low numbers and infrequent occurrences in Hawaiian waters, the endangered hawksbill sea turtle would not be expected in the transit corridor. With the implementation of the countermeasures that are a part of the Proposed Action, there is not expected to be an effect on the green sea turtle or the hawksbill turtle during the relocation of *Ehime Maru* to the shallow-water recovery site.

The endangered humpback whale would be out of Hawaiian waters by the time the transit to the shallow-water recovery site takes place, having migrated to northern waters. There would be no effect on the humpback whale. The endangered sperm whale generally occurs farther offshore and in deeper water than the transit corridor. There would be no effect on the sperm whale. Because the blue whale and fin whale are extremely rare in Hawaiian waters, no impact would be expected. The Hawaiian monk seal may only occur in the deeper offshore areas of the transit corridor on a transient basis, if moving from one island to another. The potential that a Hawaiian monk seal would be in the area on the day(s) the vessel would be transported is very low. In the nearshore areas at the shallow-water recovery site, the presence of the Hawaiian monk seal is a rare occurrence, and it is expected that there would be no effect on the species during transit.

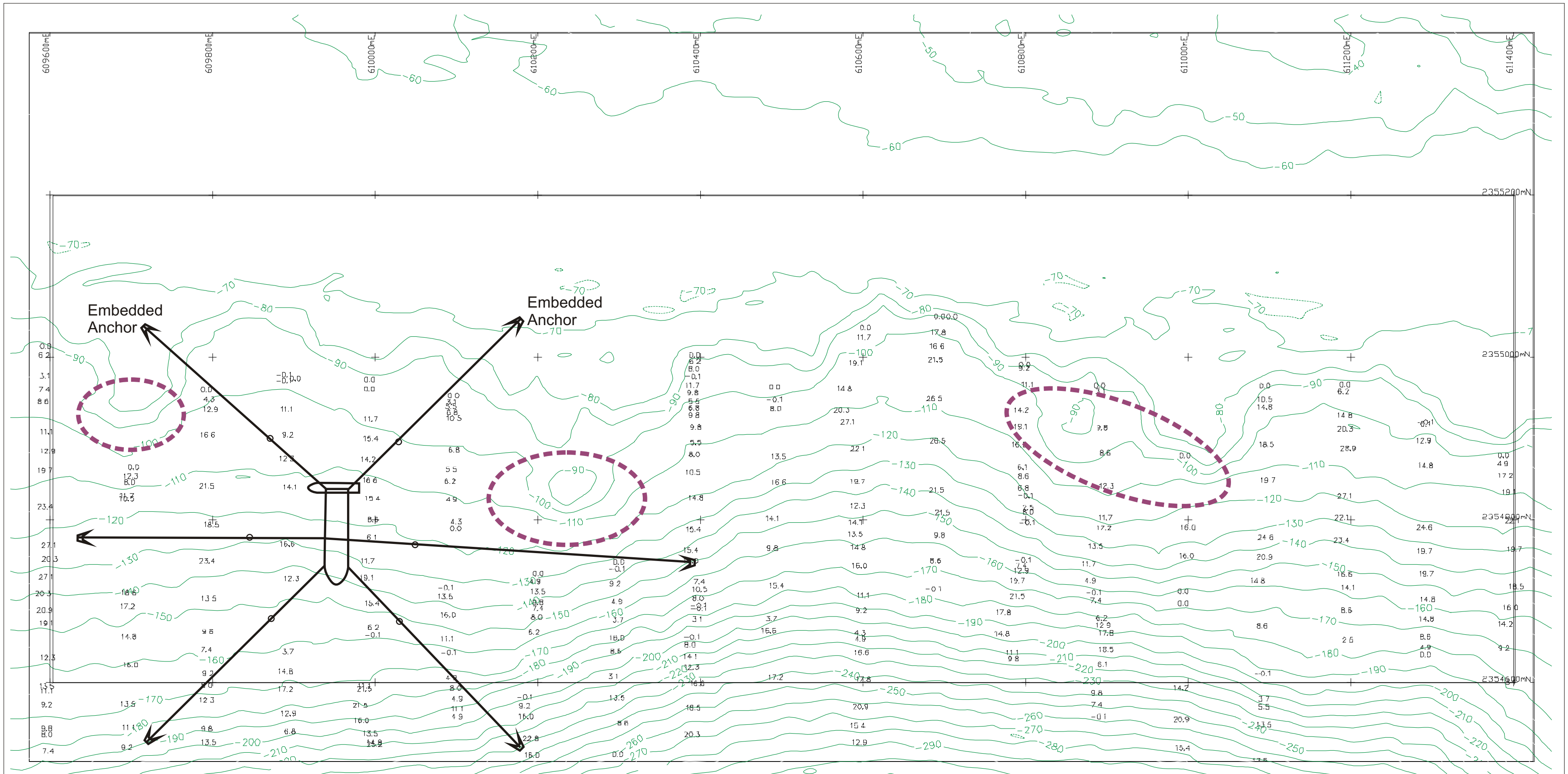
The endangered Hawaiian petrel and short-tailed albatross, and the threatened Newell's shearwater are expected to forage in the ROI. Hawaiian petrels and Newell's shearwaters may forage in the waters that surround the island of Oahu. Because of their relatively low numbers and the unlikely potential for them to forage over the transit corridor, it is expected there would be no effect on the petrels or shearwater. The use of light shields to minimize reflection would reduce disorientation of the Newell's shearwater at night during preparation by the crew for the next day's activities.

4.2.1.3 Reef Runway Shallow-water Recovery Site

Marine Fish, Essential Fish Habitat, and Coral

Disturbance to bottom-dwelling biota at the Reef Runway shallow-water recovery site could result from the following actions: (1) vessel alignment and placement at the recovery site; (2) anchoring and mooring of the diving support barge; (3) movement of ROVs and ROV umbilical cables; (4) diver activities; and (5) an unanticipated diesel fuel or lubricating oil release.

1. <u>Alignment and placement of the vessel at the shallow-water recovery site.</u> Given the dynamic positioning system of the heavy-lift ship and the habitat and bathymetric maps that have been prepared depicting sensitive resources (figures 4-2 through 4-4), the alignment and positioning of *Ehime Maru* at the Reef Runway shallow-water recovery site is not expected to result in the vessel scraping or dragging along the seaward reef slope. However, in the shallowest location, there could be minor damage to live corals, scraping of exposed sand-veneered limestone outcrops, alteration to coral rubble communities, and minor disturbance and repositioning of unconsolidated sand and rubble deposits. Because of the past disturbance to the Reef Runway shallow-water recovery site during construction of the runway, and the historic use of the area as an anchorage by large vessels, only minor impacts would be expected.



Source: Sea Engineering, Inc., 2001; John Naughton, (Sensitive Areas) NMFS/NOAA,2001

LEGEND

Lines of equal depth to seafloor (in feet)

High vertical relief with good coral growth and diverse and abundant reef fish associated with caves and layers

NORTH

Scale

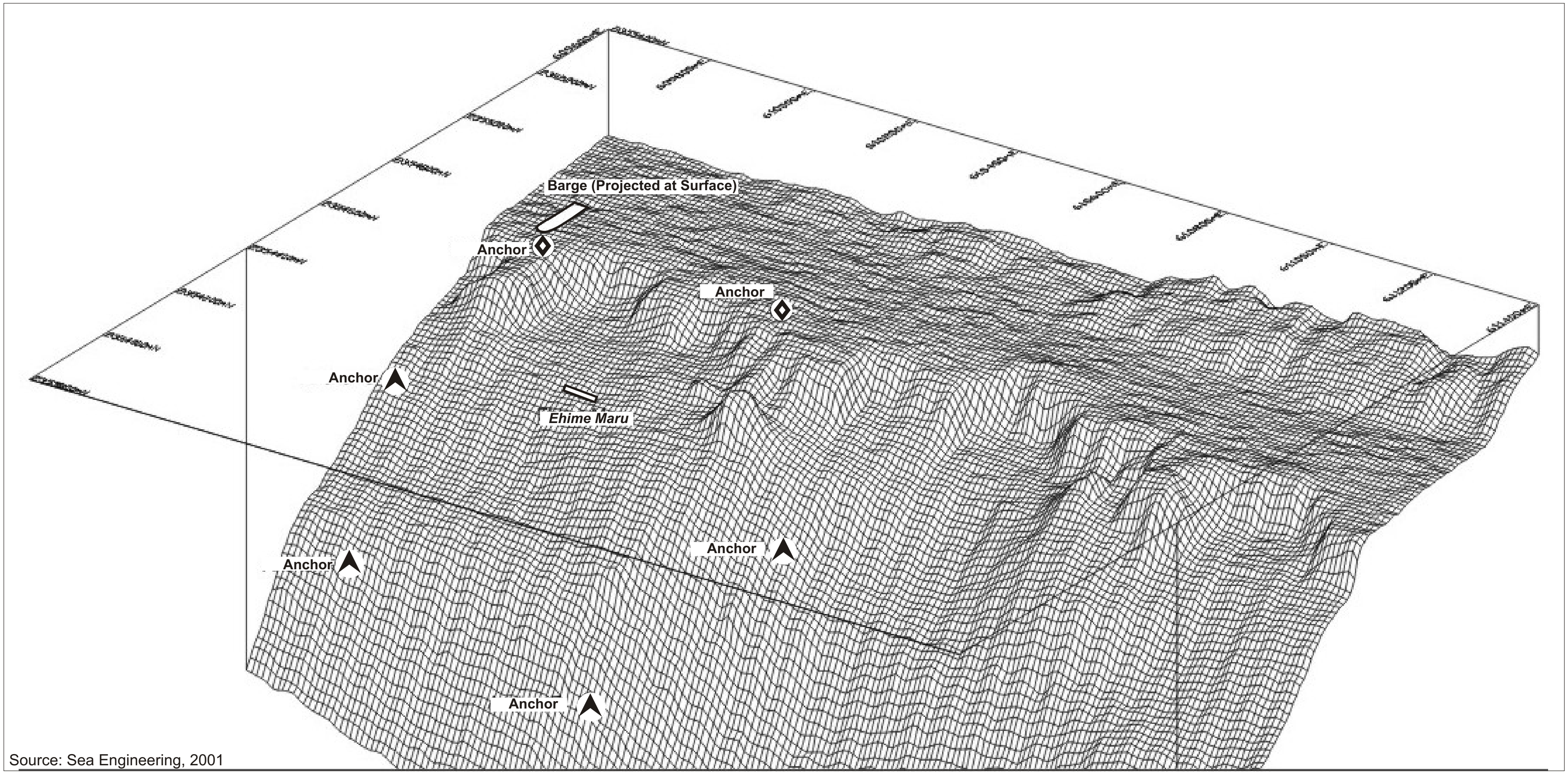
0 328 656 984 1312 Feet

0 100 200 300 400 Meters

4_2SensitveHabitat

Seafloor Bathymetry and Sensitive Resources, Reef Runway Shallow-water Recovery Area

Figure 4-2



Source: Sea Engineering, 2001

LEGEND

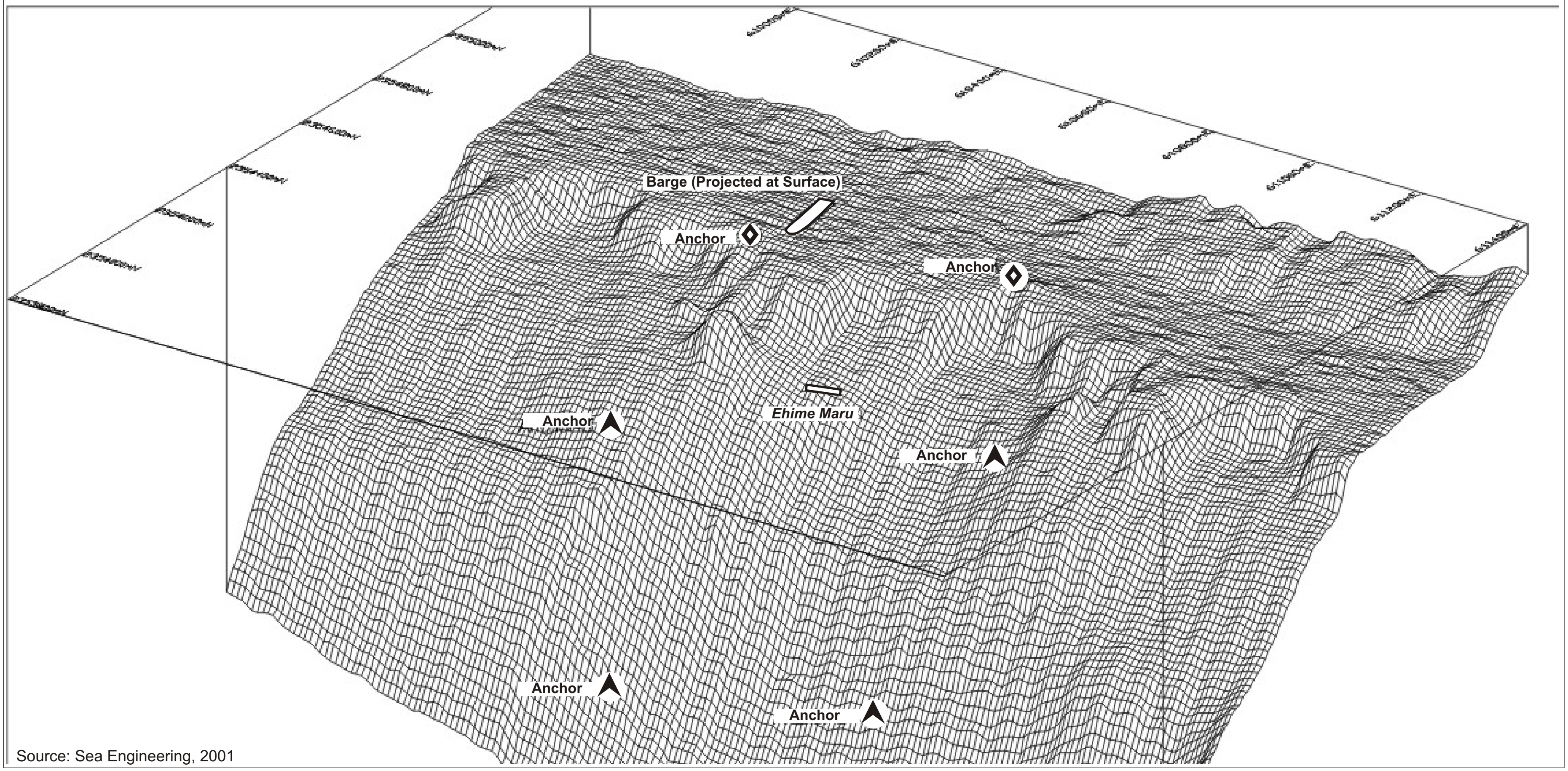
- 8,000-pound Anchors
- Embedded Anchors

NORTH

No Scale

3-D Perspective of Mooring Plan at the Primary Reef Runway Recovery Area

Figure 4-3



LEGEND

8,000-pound Anchors

Embedded Anchors

NORTH

No Scale

3-D Perspective of Mooring Plan at the Alternate Reef Runway Recovery Area

Figure 4-4

4_3_3d060101

2. Anchoring and mooring of the diving support barge. The seafloor in the area of the Reef Runway shallow-water recovery site has been disturbed in the past due to the construction of the runway and from having been a designated anchorage for naval vessels. The placement and positioning of the diving support barge's anchors and mooring chains and cables and their post-operational recovery has the potential to impact the benthic marine communities through crushing and surface abrasion. Movement of the chains and cables across the substrate on the submarine reef terraces, ledges, and slopes has the potential to damage the benthic environment, including corals and other bottom dwelling organisms. Except for the substrate on and adjacent to the submarine ridges, and the narrow escarpment between the 80- and 90-foot (24- and 27-meter) depth contours, the affected area is characterized by reef slopes and terraces of generally low (less than 1 percent) coral coverage. At depths of 95 feet (29 meters) or greater, the substrate is dominated by limestone with and without a sand veneer, and sand. Sea urchins and sea cucumbers are the principal organisms associated with this habitat type. Because of the importance and sensitivity of Hawaii's marine resources, a mooring system with a combination of traditional anchor arrangements and imbedded anchor points would be implemented. Anchors would be located to minimize anchor and chain drag and to avoid setting anchors in environmentally sensitive areas.

3. Movement of ROVs and ROV umbilical cables. The movement of ROVs and ROV umbilical cables could result in disturbance or damage to coral, coral rubble, and sand communities of moderate to low biodiversity; however, there would be no effect that would threaten the survival of the species. Such actions may also create localized areas of increased turbidity, but this would be a short-term effect.

4. Diver activities. Diver activities in and around the perimeter of *Ehime Maru* would be expected to result in minor damage to benthic communities from diver contact with scattered invertebrates, such as sea cucumbers, sea urchins, and coral colonies. Suspension of the surficial sediments by diver motions may have a short-term localized impact on corals. Potential sedimentation effects would be restricted to diver mobilization and working areas on the reef slope and are not expected to result in long-term adverse impacts to corals or other marine organisms nor would there be any effect that would threaten the survival of the species.

5. Release of diesel fuel and lubricating oil. During crewmember recovery and cleanup operations, there is an extremely low potential for an unanticipated diesel fuel or lubricating oil release if there is diesel fuel or lubricating oil remaining on *Ehime Maru*. Recovery operations would only occur during daylight hours to ensure detection of "sheens" from releases of diesel fuel and lubricating oil. Containment booms and skimmers would be located onsite. If diesel fuel or lubricating oil were to escape from initial containment areas and could potentially affect the marine environment, the booms and skimmers would be positioned to contain and recover the release of diesel fuel lubricating oil. Prevailing northeasterly trade winds and prevailing currents would carry any such surface release or "sheen" in a southwesterly direction where it would volatilize or be skimmed from the surface of the ocean in accordance with the Proposed Action. In the event of a Kona Wind (winds from the south) or other

unforeseen change in weather conditions or currents, additional booms and skimmers would be available on standby.

The Reef Runway shallow-water recovery site is within the EFH for bottomfish management unit species. The Western Pacific Regional Fishery Management Council has designated the water column and all bottom habitats from the shoreline to a depth of 1,312 feet (400 meters) as EFH for bottomfish. The Council also designated all escarpments and slopes between 131 and 919 feet (40 to 280 meters) as habitat area of particular concern. No habitat areas of particular concern for bottomfish are associated with the site because water depths of 131 feet (40 meters) are outside the recovery area. Given the recovery vessel's precise positioning capabilities, and the availability of detailed bathymetric maps, project actions are not expected to disturb the EFH for any life stage of the bottomfish management unit species.

The Council has adopted a 3,280-foot (1,000-meter) depth as a lower boundary of the EFH for pelagic management unit species, and 660 feet (200 meters) from the shoreline to the outer limits of the EEZ as the upper limit of the EFH covering eggs and larvae of the pelagic management unit species. The Reef Runway shallow-water recovery site is within the EFH for the pelagic management unit species. For the reasons described above, it is unlikely that project actions would adversely disturb the EFH for eggs and larvae of pelagic management unit species.

The Council has designated the EFH for spiny lobster larvae as the water column from the shoreline to the outer limits of the EEZ down to a depth of 492 feet (150 meters). The EFH for juvenile and adult spiny lobster is designated as the bottom habitat from the shoreline to a depth of 318 feet (100 meters). Therefore, the Reef Runway shallow-water recovery site is within the EFH for spiny lobster.

The Council has also designated all banks in the Northwestern Hawaiian Islands with summits less than 98 feet (30 meters) as habitat areas of particular concern for spiny lobster. The Reef Runway shallow-water recovery site is not within the habitat areas of particular concern for spiny lobster. Because of the relatively disturbed nature of the seafloor at the site and the relatively small area of habitat disturbance associated with relocation efforts, the recovery activities would not be expected to impact the EFH included under the crustacean management plan.

Corals are major elements of the EFH for all the management units and are key components of the marine fish habitats. Precious coral beds can occur in depths ranging from 50 to 4,900 feet (15 to 1,500 meters). The species that occurs at the shallowest end of the depth range is black coral. Black corals were not observed at the shallow-water reef runway site. The Proposed Action at the Reef Runway shallow-water recovery site would not affect the EFH for precious coral management unit species.

The introduced seagrass *Halophilia discipiens,* a potential forage area for the green sea turtle, occurs in the general vicinity of the recovery site and would not be affected by recovery operations. The native seagrass *Halophilia hawaiiana* was not observed at this shallow-water relocation site, but could occur in the area and could constitute forage for the green sea turtle. The proposed shallow-water recovery site would be surveyed for the presence of *H. discipiens*, which may support the endemic gastropod *S. bryanae*. The Reef Runway shallow-water recovery site was reviewed by underwater reconnaissance by resource agency personnel, who provided assistance in the selection of the shallow-water recovery site. The extent of impacts to the corals and EFH would be expected to be minimal because of the care undertaken in selecting a recovery area.

Marine Mammals

There is a potential for impacts to marine mammals due to the release of diesel fuel and lubricating oil during the placement of *Ehime Maru* at the Reef Runway shallow-water recovery site. Spinner dolphins use the nearshore area of the coastline from approximately Barbers Point to Waikiki. Bottlenose dolphins have been shown to identify and avoid diesel fuel and lubricating oil when it is present. Other dolphins may also be expected to do so. In the nearshore and onshore area where the Reef Runway shallow-water recovery site is located, the presence of a Hawaiian monk seal is a rare occurrence. The migratory humpback whale would have already left for the northern feeding grounds and would not be in the area. The sperm whale does not occur in the nearshore shallow water along the Oahu coastline.

Migratory Birds

The use of containment booms and skimmers in accordance with the Proposed Action would further reduce the potential for impacts to migratory seabirds.

With the implementation of the diesel fuel and lubricating oil release response component of the Proposed Action, there should be no impacts on the common shorebirds that frequent the area of the Reef Runway shallow-water recovery site. These include the Pacific golden plover, ruddy turnstone, sanderling, wandering tattler, and black-bellied plover. The Hawaiian black-necked stilt, which occurs in mudflats within the Keehi Lagoon, would be protected by implementation of the contingency plans. Implementation of these plans would also protect the Hawaiian coot, which may use the more brackish waters in the Keehi Lagoon.

Threatened and Endangered Species

The threatened green sea turtle occurs in nearshore waters in the area of the Reef Runway shallow-water recovery site but is not as common as at other locations to the west of Pearl Harbor. A single adult green sea turtle was observed on May 19, 2001 at a depth of 70 feet (21 meters). Green sea turtles are also known to rest along the Fort Kamehameha sewage outfall. Due to construction of the runway channel, dredging, and use of the area as a designated anchorage, the area of the Reef Runway shallow-water recovery site is a disturbed habitat. Some seagrasses and relatively scattered and discontinuous areas of live coral are present at the shallower depths less than 70 to 80 feet (21 to 24 meters), and in a narrow escarpment between the 80- and 90-foot (24- and 27-meter) depth contours. However, *Ehime Maru* would be placed in approximately 115 feet (35 meters) of water, and this is at greater depths than corals and seagrass have been noted in substantial amounts. Thus, the activities at this location are not expected to affect green sea turtle feeding or resting areas. Mooring activities might involve small areas within the 50 to 70 foot (15 to 21 meter) range for anchor placement. Avoidance techniques would be employed to minimize effects to individual corals and seagrasses.

Because of their low numbers and infrequent occurrences in Hawaiian waters, the endangered hawksbill sea turtle would not be expected to be in the area of the Reef Runway shallow-water recovery site. With the implementation of the diesel fuel and lubricating oil release response element in the Proposed Action, the activities at the Reef Runway shallow-water recovery site are not expected to have an effect on the green sea turtle or the hawksbill turtle.

The endangered humpback whale would be out of the Hawaiian waters by the time the Proposed Action takes place, having migrated to northern waters. Therefore, the Proposed Action would have no effect on the humpback whale. The endangered sperm whale occurs in deeper water than the nearshore water of the Reef Runway shallow-water recovery site. There would be no effect on the sperm whale. Because the blue whale and fin whale are extremely rare in Hawaiian waters, no impact would be expected.   In the onshore area where the Reef Runway shallow-water recovery site is located, the presence of a Hawaiian monk seal is a rare occurrence, and it is expected that there would be no effect on the species during the recovery process.

The endangered Hawaiian petrel and short-tailed albatross, and the threatened Newell's shearwater are expected to forage in the ROI. Hawaiian petrels and Newell's shearwater may forage in the waters that surround the island of Oahu. In addition, with the implementation of the diesel fuel and lubricating oil release response element of the Proposed Action, the recovery activities at this site would be expected to have no effect on the Hawaiian black-necked stilt, Hawaiian coot, Hawaiian duck, and Hawaiian moorhen.

4.2.1.4 Transit to the Deep-water Relocation Site

The transit corridor from the shallow-water recovery site to the deep-water relocation site would have little potential for impacts on the marine ecosystem. After the recovery action and the cleanup of diesel fuel and lubricating oil and loose debris from *Ehime Maru*, there would be too little diesel fuel or lubricating oil residue to cause an environmental impact. If not all of the diesel fuel or lubricating oil was removed during the recovery effort, the potential impacts from transit to the deep-water relocation site would be similar to impacts from the transit to the shallow-water recovery site. Overall, there would be no effect of the transport of the vessel to the deep-water relocation site on any EFH, migratory seabirds, marine mammals, or threatened or endangered species.

4.2.1.5 Deep-water Relocation Site

At the deep-water relocation site, a battery-powered pinger (an echo sounding depth recorder) attached to *Ehime Maru* for use in identifying the specific relocation site of the vessel would be activated. The pinger would remain active for about 30 days. The pinger generates sound at a frequency of 37.5 kHz at an initial 160.5 decibels (dB) re micropascal at 1 meter. After 30 days, the output would decline to 157 dB. This level is well within the hearing range of most small whales and dolphins, which can hear up to at least 100 kHz. The 37.5 kHz frequency sound of the pinger falls within the area of best sensitivity (figure 4-5) (Nachtigall et al, 2000). The frequency of the pinger is relatively high, and as a high frequency sound it will decay rapidly with distance. Figure 4-6 shows the predicted signal attenuation over distance. Most small whales or dolphins have the ability to hear the pinger if it exceeds 60 dB (figure 4-5). This sound level corresponds to a distance of approximately 9,000 to 12,000 feet (3,000 to 4,000 meters) from the pinger. The pinger signal would not be as loud at the surface as it would be at the source on the seafloor. At the approximate depth at which *Ehime Maru* comes to rest at 6,000 feet (2,000 meters), the sound level at the surface would be 77 dB.

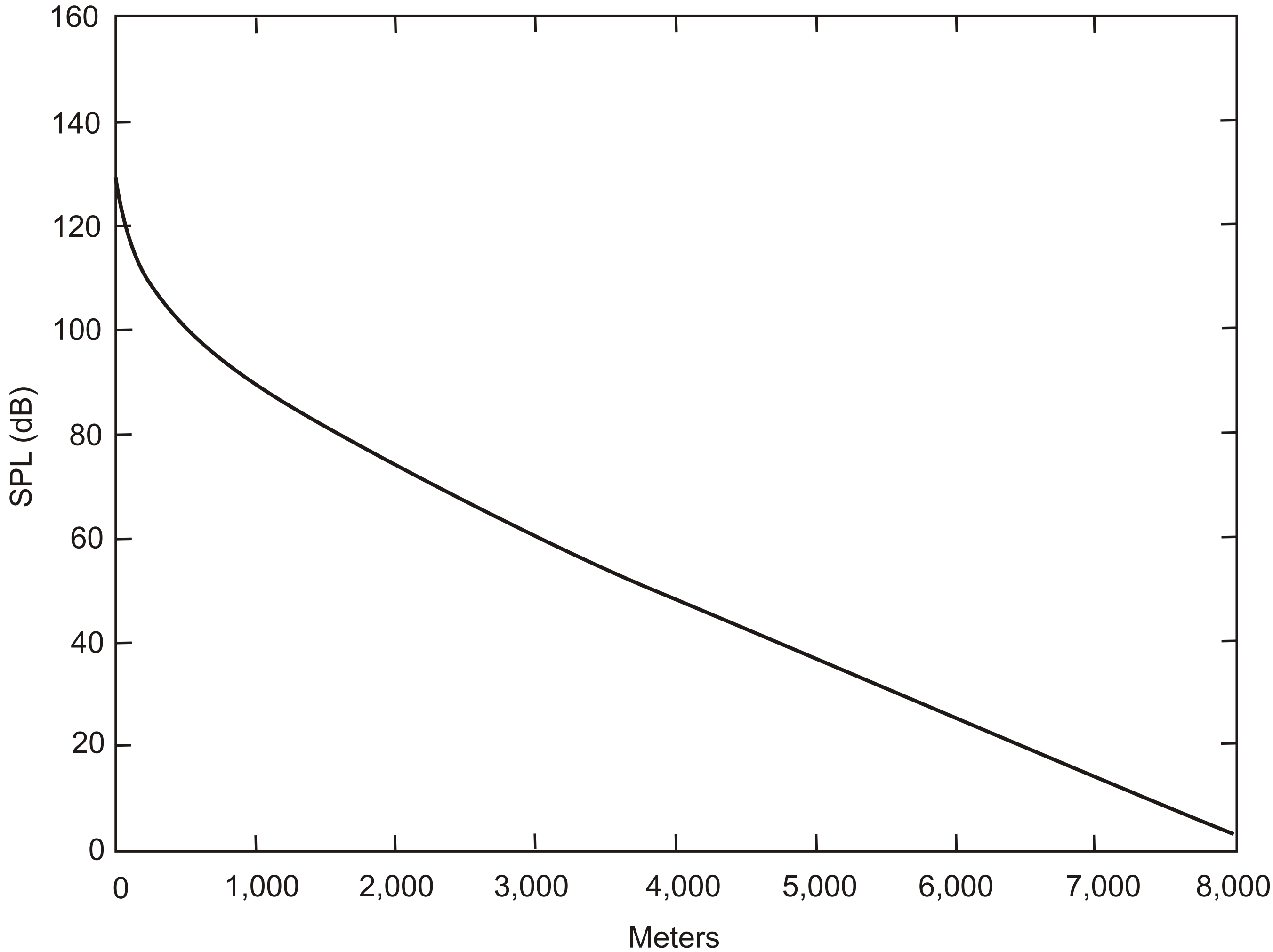
A dolphin searching for a small object beyond 300 feet (100 meters) produces ecolocation clicks exceeding 225 dB (Au, 1993). Dolphin breeches and tail slaps often produce sounds exceeding 150 dB (Nachtigall et al., 2000b). Dolphin whistles generally range between 140 to 150 dB. Animal detection of a sound does not indicate that it would be bothered by the sound. Therefore, the likelihood of small whales and dolphins being disrupted by the pinger is expected to be low.

The Hawaiian monk seal's hearing (Thomas et al., 1990) does extend as high as 40 kHz, but the threshold for hearing at that frequency is 128 dB. Therefore it is extremely unlikely that any Hawaiian monk seal will hear the pinger or be bothered by it.

If diesel fuel or lubricating oil remains on *Ehime Maru* after the recovery efforts, potential impacts from a release to marine resources would be similar to those described under the current location. No significant impacts to marine resources including EFH, migratory seabirds, marine mammals, or threatened or endangered species are expected due to the relocation of *Ehime Maru* to the deep-water site.

4.2.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

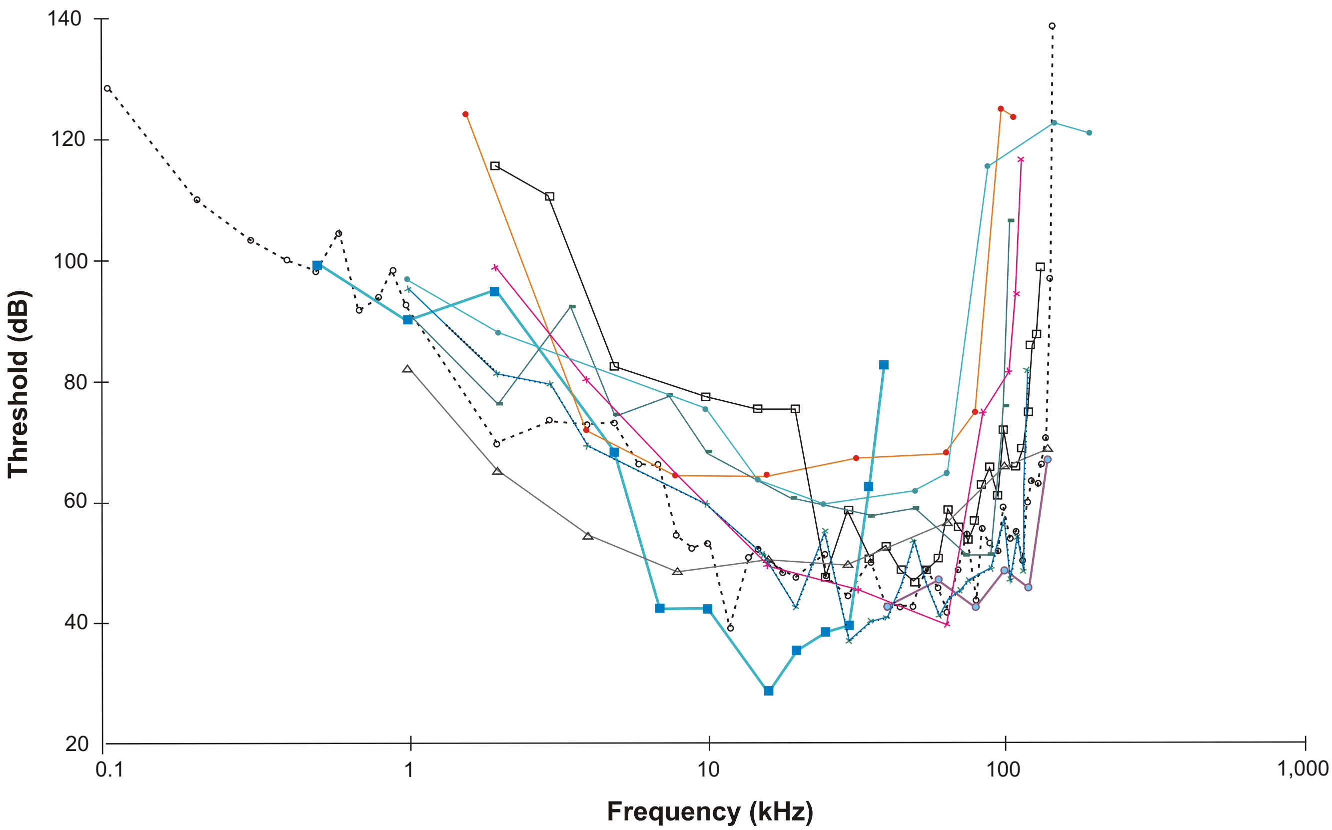
If the Recovery-not-possible Alternative is chosen, *Ehime Maru* would not be recovered and would remain at its current location in its present condition. This alternative would not allow for the recovery of *Ehime Maru* crewmembers, personal effects, and certain characteristic components, or for the removal of diesel fuel and lubricating oil. Because cargo nets, fishing hooks and long lines, rafts, rigging on the masts and other obstacles would not be removed under this alternative, there could be potential impacts to marine resources.



Source: Nachtigall, 2001

Sound Pressure Level at Varying Distances From Pinger

Figure 4-5



Source: Nachtigall, Lemonds, and Roitblat, 2000

LEGEND

- Tursiops truncatus
- Tursiops gilli
- Phocoena phocoena
- Orcinus orca
- Pseudorca crassidens
- Grampus griseus
- Delphinapterus leucas
- Inia geoffrensis
- Lipotes vexillifer
- Tursiops truncatus

dB - Decibel
kHz - kilohertz

Hearing Thresholds of Dolphins and Small Whales

Figure 4-6

4_6Audiograms052601

4.3 HEALTH AND SAFETY

The potential impacts to both public and worker health and safety associated with underwater recovery operations would occur both in and on the ocean and on the shore. Potential impacts could occur as a result of increased safety risk at the recovery sites, during diving activities, and to the public near the recovery operations.

The potential for the release and the proposed response to remediate an unanticipated release of diesel fuel or lubricating oil are discussed in detail in section 4.4 (Hazardous Materials and Hazardous Waste). As analyzed in that section, any unanticipated release that would occur would be quickly responded to in accordance with the IAP (Naval Sea Systems Command, 2001a); therefore, there would be minimal increased risk to public health and safety as the result of an unanticipated release. Additionally, because of the procedures and equipment that would be in place, there would be minimal increased risk to public recreation areas or commercial use areas.

4.3.1 PROPOSED ACTION

Both the U.S. Navy and the contractors associated with the recovery of *Ehime Maru* have safety policies and procedures relating to the performance of all activities within the scope of their operations. Individuals, supervisors, and managers give full support to safety efforts. Safety awareness and strict compliance with established safety standards would occur during recovery operations. More detail on recovery and diver safety is provided below.

Inclement weather conditions could also pose a potential safety hazard. Adverse weather conditions include high wind and sea conditions, and hurricanes. It is the Navy Recovery Commander's responsibility to determine if the weather conditions are potentially hazardous, based on available information, experience, and the operational limits of the recovery vessels. Because of the procedures noted above to monitor weather conditions, there would be minimal increased safety risk as a result of weather.

A Site Safety and Health Plan has been prepared for all personnel associated with the cleanup of any diesel fuel or lubricating oil. The Site Safety and Health Plan focuses on the protection of personnel from serious risks to their physical safety and health while responding to a marine discharge. This plan identifies the potential hazard conditions and outlines the specific safety and health training together with the job skills and procedures appropriate to the responder's role in the response operations. Appropriate personnel involved in the cleanup operation will receive training to ensure their awareness of the Site Safety and Health Plan.

4.3.1.1 Current Location

The current location of *Ehime Maru* is within U.S. territorial waters. This is not a restricted use area. The primary activities that would occur in this area would be associated with the initial lifting operation. During these recovery operations, all workers would adhere to specific safety procedures to minimize the risk to worker health and safety.

The primary activities related to the public in this area are commercial and recreational fishing; however, there would be minimal risk to public health and safety, as they would be excluded from the area around the recovery effort. A temporary flight restriction and a surface safety zone, each with a 3-nautical mile (approximately 6-kilometer) radius, would be established over the lift preparation area. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request that dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities.

4.3.1.2 Transit to the Shallow-water Recovery Site

During transit operations there is the potential for an impact to worker and public safety. Potential impacts to worker safety could occur as a result of a mishap during transit operations; however, the appropriate safety procedures would be followed to minimize the risk to worker safety. These procedures would include a survey of the seafloor for potential obstructions. Additionally, adverse weather could increase the potential for a mishap. The National Weather Service and the Navy Meteorological Office at Pearl Harbor would be constantly monitored for weather information. To ensure the lift and transit is accomplished safely, transit would only be conducted during favorable sea states and during daylight hours. The transit speed would be approximately 1 nautical mile per hour (approximately 2 kilometers per hour). It is the Navy Recovery Commander's responsibility to determine if the weather conditions are potentially hazardous, based on available information, experience, and the operational limits of the recovery vessels.

Public ocean activities occurring within the ROI along all transit routes consist of both commercial and recreational fishing until nearshore waters are reached, and then activities become more oriented towards coastal recreation and commercial traffic. However, there would be minimal risk to public health and safety, as established security perimeters would exclude the public from the area around the transit route. A temporary flight restriction and a surface safety zone, each with a 1-nautical mile (approximately 2-kilometer) radius, would be established over the transit route. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities. The temporary flight restriction would not interfere with commercial air operations at Honolulu International Airport.

The last 2 nautical miles (approximately 4 kilometers) of the transit route to the Reef Runway shallow-water recover site would occur within the Naval Defense Sea Area. The Reef Runway shallow-water recovery site is within the Naval Defense Sea Area established by Executive Order 8143 that prohibits civilian watercraft within Pearl Harbor and the area immediately surrounding the entrance to Pearl Harbor unless authorized by the Navy. Because the Navy has jurisdiction over the Naval Defense Sea Area, the Pearl Harbor Entrance Channel and Hickam Harbor are restricted to vessels owned and operated by military and DoD personnel. Several commercial fishing and tour boats have been authorized to operate in the Pearl Harbor vicinity; however, civilian boats are not allowed inshore of the Reef Runway shallow-water recovery site. The restricted access in this area would minimize the potential for public safety issues.

4.3.1.3 Reef Runway Shallow-water Recovery Site

Potential health and safety issues at the shallow-water recovery site would specifically be associated with hazards to the public and divers. Health and safety issues related to an unanticipated diesel fuel or lubricating oil release are addressed in section 4.4 (Hazardous Materials and Hazardous Waste). As analyzed in that section, the Navy would be prepared with the appropriate plans and equipment for a maximum credible release, thus there should be minimal increased safety risk to public health and safety.

Public Safety

The diving operation could generate interest from the public. The ability to establish and control public access would be essential to protect the safety of both the general public and divers. To ensure the protection of all persons and property, a 1-nautical mile (2-kilometer) surface safety zone around the recovery operations would be established and implemented for operations in these areas. Therefore, there would be minimal risk to the public during these activities.

Diver Safety

Diver safety would be of paramount importance, and all safety measures would be followed during recovery operations. The Navy would establish a surface safety zone around the recovery operations to ensure diver safety. The Coast Guard would respond to any violations of this ground safety zone. Voice communication integrity for the diving recovery operations would be maintained. A temporary flight restriction area at and below 2,000 feet (610 meters) with a radius the same as that of the surface safety zone may be established. A more detailed discussion of airspace and related issues is provided in section 4.5 (Airspace).

During the recovery effort, there is a potential for an increased risk to diver safety. To ensure diver safety, all operations are conducted in accordance with *The U.S. Navy Diving Manual*. This manual, which is based on the Navy's long history of conducting diving operations, provides the latest procedures and equipment for conducting safe diving activities. *The U.S. Navy Diving Manual* identifies the required equipment and procedures for using surface-supplied diving equipment as well as the requirements for emergency gas supply equipment that is used for enclosed space diving. Operating procedures and emergency procedures would be in place to support operation of the system and recovery from emergency situations. In addition, a Diving Medical Officer would be onboard the diving support vessel at all times and would be accompanied by diving medical technicians. Standby divers would be available at all times to render emergency assistance. To ensure appropriate communication between divers, the dive teams would practice together for at least a week before the recovery operations. Given the in-place procedures and equipment, there would no increased risk to diver safety compared to other diving operations.

The Navy Recovery Commander would establish appropriate diver safety requirements for all aspects of environmental response operations. Cleanup standards for oil and hazardous materials removal prior to deep-water relocation would not be achieved if they increase the risk to diver safety. Further, without prior consultation with the Navy Recovery Officer, divers would not undertake any action that might result in an immediate release of oils or hazardous materials into the shallow-water marine environment (Naval Sea Systems Command, 2001b).

In summary, the Navy has a long history of providing diver safety and has extensive experience in conducting diving operations similar to those associated with this recovery effort. Every effort would be taken during recovery operations to minimize the risk to diver health and safety; therefore, no impacts would be expected.

The diving barge has limited medical support capabilities. In the event of a life-threatening emergency, the amount of time required to transfer a diver or barge worker to a hospital would be critical. At least two chambers installed on the barge would be used for surface decompression with oxygen, and the chambers would also be used for the treatment of arterial gas embolism. The Fleet Recompression Chamber is at MDSU-ONE, Pearl Harbor and would be less than 15 minutes away by boat.

Just outside of this area there is the potential for unexploded ordnance on the seafloor. However, the Navy would conduct a survey of the seafloor, and if any unexploded ordnance were found, it would be marked and avoided.

4.3.1.4 Transit to the Deep-water Relocation Site

Since most hazardous materials would have been removed and the ship's compartments would have been sealed to the maximum extent possible, the potential environmental consequences to health and safety from transit to the deep-water relocation site would be minimal. To further ensure safety, a temporary flight restriction and a surface safety zone, each with a 1-nautical mile (approximately 2-kilometer) radius, would be established over the transit route. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities.

4.3.1.5 Deep-water Relocation Site

The deep-water relocation site would be outside U.S. territorial waters. The water at this site is at least 1,000 fathoms (1,800 meters) in depth. A temporary flight restriction and a surface safety zone, each with a 3-nautical mile (approximately 6-kilometer) radius, would be established over the deep-water relocation site. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTMARs and NOTAMs be issued to warn the public of the potentially hazardous activities. Given the depth of this site and that most hazardous materials would have been removed and the ship's compartments would have been sealed to the maximum extent possible, there would be no associated health and safety issues.

4.3.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, the recovery operation would not be initiated and *Ehime Maru* would be left in its current location and present condition. This alternative would not allow for the recovery of crewmembers or the removal of diesel fuel and lubricating oil. Due to the depth, 2,000 feet (600 meters), there would be no increased risk to public health and safety from the implementation of this alternative.

4.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

Impacts from the release of hazardous materials could occur during transit and recovery operations. These impacts would be associated with the unanticipated release of diesel fuel or lubricating oil that may remain in *Ehime Maru*, which could affect water quality, biological resources, and land coastal areas used for a variety of public and private activities. This section addresses the potential for a release and the procedures and equipment in place to minimize harm to the environment.

4.4.1 PROPOSED ACTION

Of the original 65,000 gallons (246,000 liters) of diesel fuel on board *Ehime Maru*, the maximum amount expected after the collision is estimated at 45,000 gallons (170,000 liters). In addition, 1,200 gallons (4,500 liters) of lubricating oil was onboard and may remain. An unanticipated release could occur during any phase of the recovery operations. During such a release, the Navy would have the procedures and equipment in place to minimize the effect of the release. The Navy would use all available resources to protect the environment from any release of diesel fuel or lubricating oil from *Ehime Maru*. These measures are appropriate given the high environmental and economic sensitivity of Hawaiian waters and shorelines and the unusually long lead-time allowed for planning the potential unanticipated release response (Naval Sea Systems Command, 2001a). All diesel fuel and lubricating oil recovery efforts would be in compliance with federal, state, and local regulations.

The risk of a significant unanticipated diesel fuel or lubricating oil release is considered minimal. It is likely that most or all of *Ehime Maru's* fuel tanks are open to the ocean or to the vessel's internal compartments through open tank vents. The integrity of the fuel tanks was potentially compromised from the collision damage and the crushing effects of water pressure on partially filled tanks as *Ehime Maru* descended rapidly to 2,000 feet (600 meters). It is likely that most of the diesel fuel or lubricating oil that could be released has already escaped at depth in the open water, where it was quickly diluted and resulted in minimal environmental effect.

Based upon research into *Ehime Maru's* fuel and lubricating oils, it appears that the fuel is diesel fuel. Diesel fuel is a light, refined petroleum product with a relatively narrow boiling range. This means that when it is released to water, most of the oil will evaporate or naturally disperse (or weather) within a few days or less. Diesel fuel has a very low viscosity and is readily dispersed into the water column when winds reach 5 to 7 knots (approximately 10 to 14 kilometers per hour) or sea conditions are approximately 3 feet (1 meter). Diesel fuel is much lighter than water, and it is not possible for this oil to sink and accumulate on the seafloor as pooled or free-phase oil. However, it is possible for diesel fuel to be physically mixed into the water column by wave action, forming very small droplets that are carried and kept in suspension by the currents. Diesel fuel is not very sticky or viscous. Shoreline cleanup is usually not needed (National Oceanic and Atmospheric Administration, 2001a). The lubricating oil is more persistent oil, but the Navy anticipates very little of the 1,200 gallons (4,500 liters) would remain because of the likely location and extent of the collision damage.

In terms of toxicity to water-column organisms, diesel fuel is considered to be one of the most acutely toxic oil types. Fish, invertebrates, and seaweed that come in direct contact with a diesel fuel release may be killed. Crabs and shellfish can be tainted from small diesel fuel releases in shallow, nearshore waters. (National Oceanic and Atmospheric Administration, 2001a) Significant releases must be recovered or dispersed before they impact the sensitive resources in Hawaii's nearshore waters (Everson, 2001).

Lifting *Ehime Maru*, transporting it to shallow water, and recovery operations with the vessel resting on the bottom in shallow water may result in continued "sheening" as very small volumes of residual diesel fuel and lubricating oil would be released from the vessel and rise to the sea surface. The Proposed Action includes responses to an unanticipated release of diesel fuel or lubricating oil with advanced mechanical and dispersant capability (Naval Sea Systems Command, 2001a). As part of the contingency plan for unanticipated releases of diesel fuel or lubricating oil, an IAP has been prepared (appendix F) and details the roles and responsibilities of all groups involved and the actions required if an unanticipated release should occur. This plan would also detail sensitive resources and the action that would be taken if an unanticipated release were to occur in their vicinity. If an unanticipated release should occur, the appropriate resource trustees (e.g., U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Land and Natural Resources) would be contacted. The U.S. Coast Guard and the Navy would activate an Incident Command structure that would include establishing a Unified Command to be available in the event of an unanticipated release.

The capability of the Navy to respond to anticipated releases described in the Proposed Action consists of three Navy-owned skimming systems, each with a daily recovery capacity of 57,000 gallons (220,000 liters). The Navy would also contract with the Clean Islands Council for a oil spill response vessel with two skimmer systems, each with a daily recovery capacity of approximately 62,000 gallons (235,000 liters). Additionally, dispersant systems would be available that could be deployed. The total capability of these recovery systems exceeds the total expected remaining diesel fuel and lubricating oil on *Ehime Maru*.

Relatively minor diesel fuel or lubricating oil release levels with minimal environmental impact would be anticipated during vessel recovery operations. Periodic overflights would be performed to observe any signs of a release. Any sheening would be highly visible from the air. However, sheening might not be eliminated entirely with booms and skimmers, and alternate actions may be warranted (sorbents, monitoring, or weathering). In the event of an unanticipated release, the Navy would work with the Coast Guard Captain of the Port, the State of Hawaii, and other federal, state, and local government agencies to amend the IAP in any way practicable to minimize environmental impacts. The recovery operation would maximize the use of available response resources.

Overall, given the procedures and equipment that would be in place to respond to an anticipated release, only minor impacts would be expected. Additionally, preplanning and establishment of an IAP and a Unified Command would provide ready access to additional capabilities (sorbents, dispersants) in the event of an unanticipated release.

4.4.1.1 Current Location

The risk of a diesel fuel or lubricating oil release from *Ehime Maru* as a result of deep-water rigging and lift is considered low, except to the extent that the vessel may be partially rigged and lifted or moved to facilitate further positioning of lift gear. If the vessel is lifted or moved during the rigging phase, release response equipment would be standing by similar to that of the lift and transit phase between the current location and the shallow-water recovery site. Otherwise, response equipment would remain at their normal shoreside staging sites during deep-water rigging. In the event of a diesel fuel or lubricating oil release, offshore site control would consist of vessel safety and area exclusion policies as set forth in the recovery plan. For unanticipated releases, similar measures are outlined in the IAP. Although abrupt changes in sea state could put smaller vessels at risk, there would be no public safety concerns as a result of a diesel fuel or lubricating oil release.

4.4.1.2 Transit to the Shallow-water Recovery Site

Transit activities would occur only during daylight hours to ensure prompt detection of “sheens” from diesel fuel or lubricating oil releases. If diesel fuel or lubricating oil remains on the vessel, it is likely that some would be released as the vessel is initially lifted through the water column and transported toward the shallow-water recovery site. There is some potential that the structural integrity of the vessel has been too severely damaged to withstand the dynamic loads of the lift, and as a result, may accelerate the rupture and release of remaining fuels. However, a release in deep, offshore waters should have minimal impact. Diesel fuel or lubricating oil released from the seafloor would be visible under most weather conditions. Periodic overflights would be conducted to observe for any signs of a release. As described in section 2.1.3.5, the Proposed Action establishes procedures and calls for the placement of equipment before the initiation of lift and relocation activities to minimize the potential for diesel fuel or lubricating oil reaching shore. Given the measures in place to respond to a potential diesel fuel or lubricating oil release, there would be minimal impact to the environment or public use areas.

National Oceanic and Atmospheric Administration conducted modeling (2001a) to determine optimal sea-state and wind conditions for transit to the shallow-water recovery site. These models assumed an average wind speed of 10 knots (20 kilometers per hour) at the shallow-water recovery site and were run for ebb and flood tide conditions. Trade winds between 10 and 20 knots (20 and 40 kilometers per hour) are normal during the time of year operations would be conducted. Overall, these models showed that winds from the east would push the diesel fuel toward the beach during both tidal conditions over a 24-hour period (figures 4-7 and 4-14) with no intervention. Winds from the east/northeast could also potentially push the diesel fuel toward the beach during either tidal condition over a 24-hour period (figures 4-9 and 4-10) with no intervention. Winds from the north or northeast would push the diesel fuel out to sea (figures 4-11 to 4-14). Kona winds were not modeled since it is readily acknowledged that these winds would push the diesel fuel directly towards the beach. The General National Oceanic and Atmospheric Administration Oil Modeling Environment model that was used has a confidence limit of 90 percent. This means there is a 90 percent certainty the diesel fuel would not go past the confidence limit shown on figures 4-7 to 4-14.

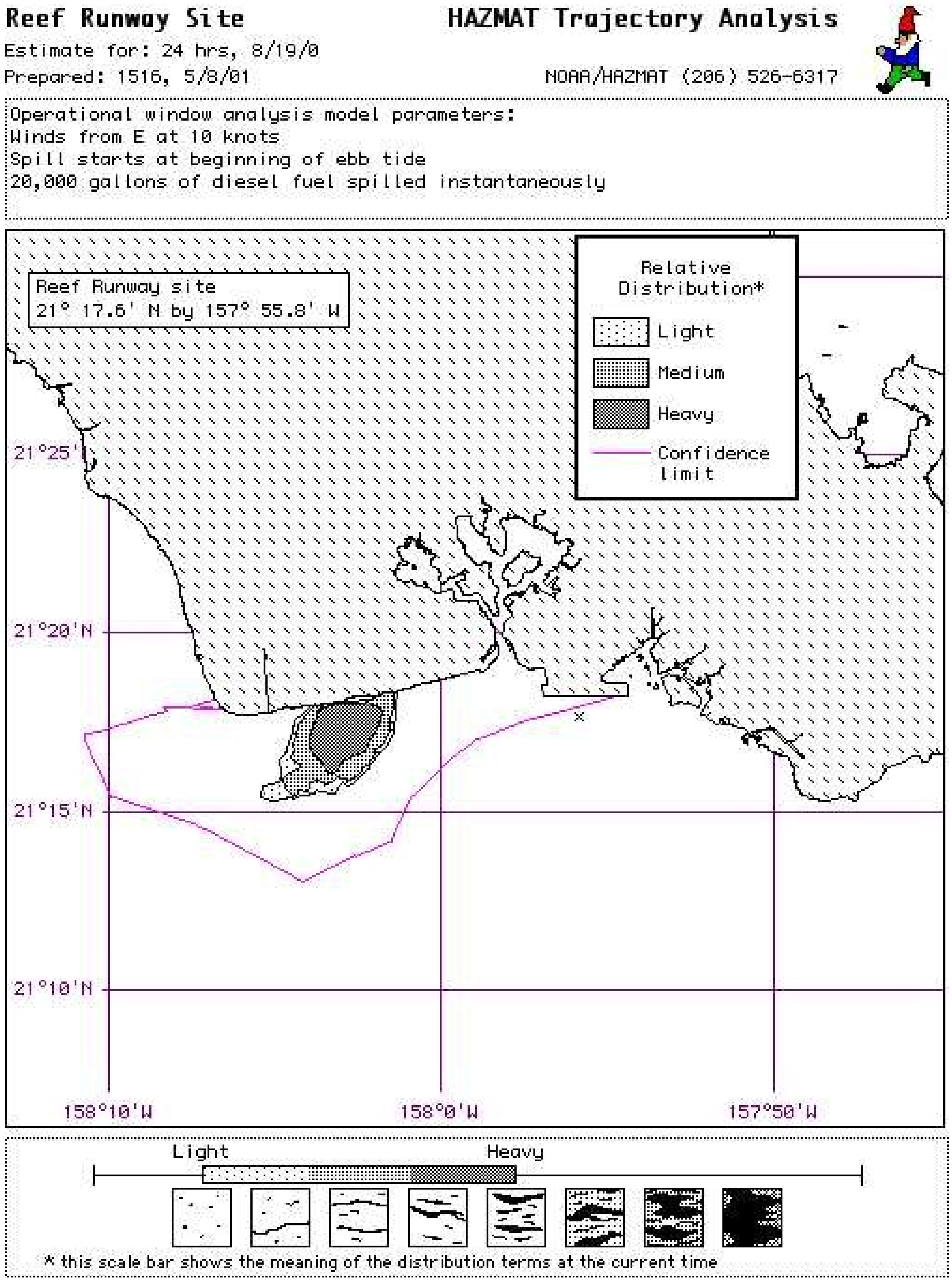
Light trade wind conditions (less than 10 knots [20 kilometers per hour]) during morning hours occur relatively infrequently; however, they can serve as an indicator for an afternoon seabreeze. A seabreeze occurs when the warm air over a land mass rises and cooler air (from the ocean) moves in to replace it. During an uncontained diesel fuel or lubricating oil release, a seabreeze could potentially result in an uncontained release being pushed toward the shore. Because this is also readily acknowledged, these wind conditions also were not modeled (National Weather Service, 2001). Table 4-1 shows the potential for diesel fuel to reach the shore based on a variety of wind directions and tidal conditions.

Table 4-1: Potential Impacts to Shore

Wind Direction	Ebb Tide	Flood Tide
East	Moderate	Moderate
East-Northeast	Low	Low
North	Low	Low
Northeast	Low	Low
Kona*	High	High
Southerly*	High	High

Source: National Oceanic and Atmospheric Administration, 2001a

*Kona and southerly winds not modeled.



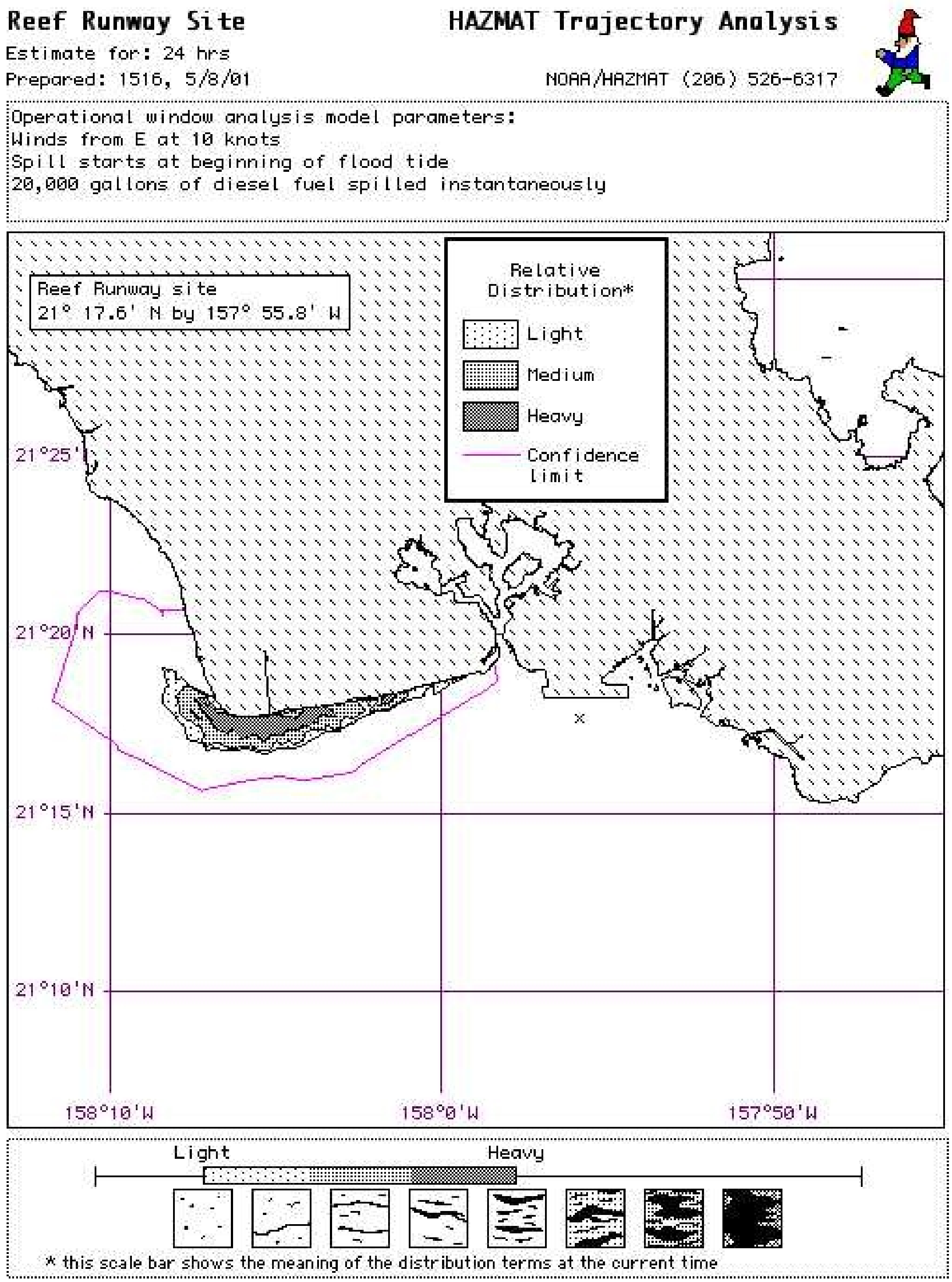
Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds East at Ebb Tide

Figure 4-7

No Scale

4_7Traj_eebb051801

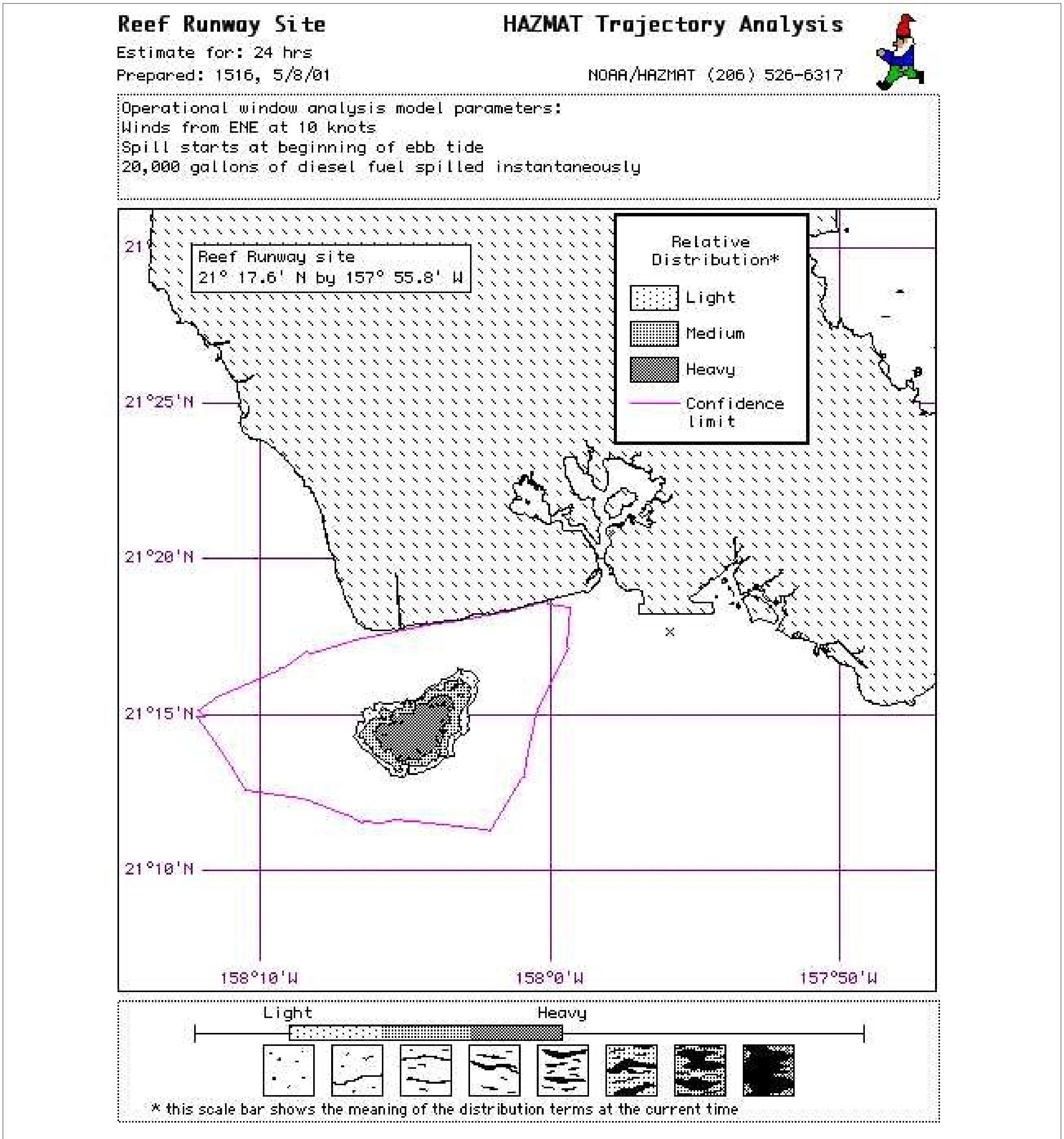


Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds East at Flood Tide

Figure 4-8

No Scale

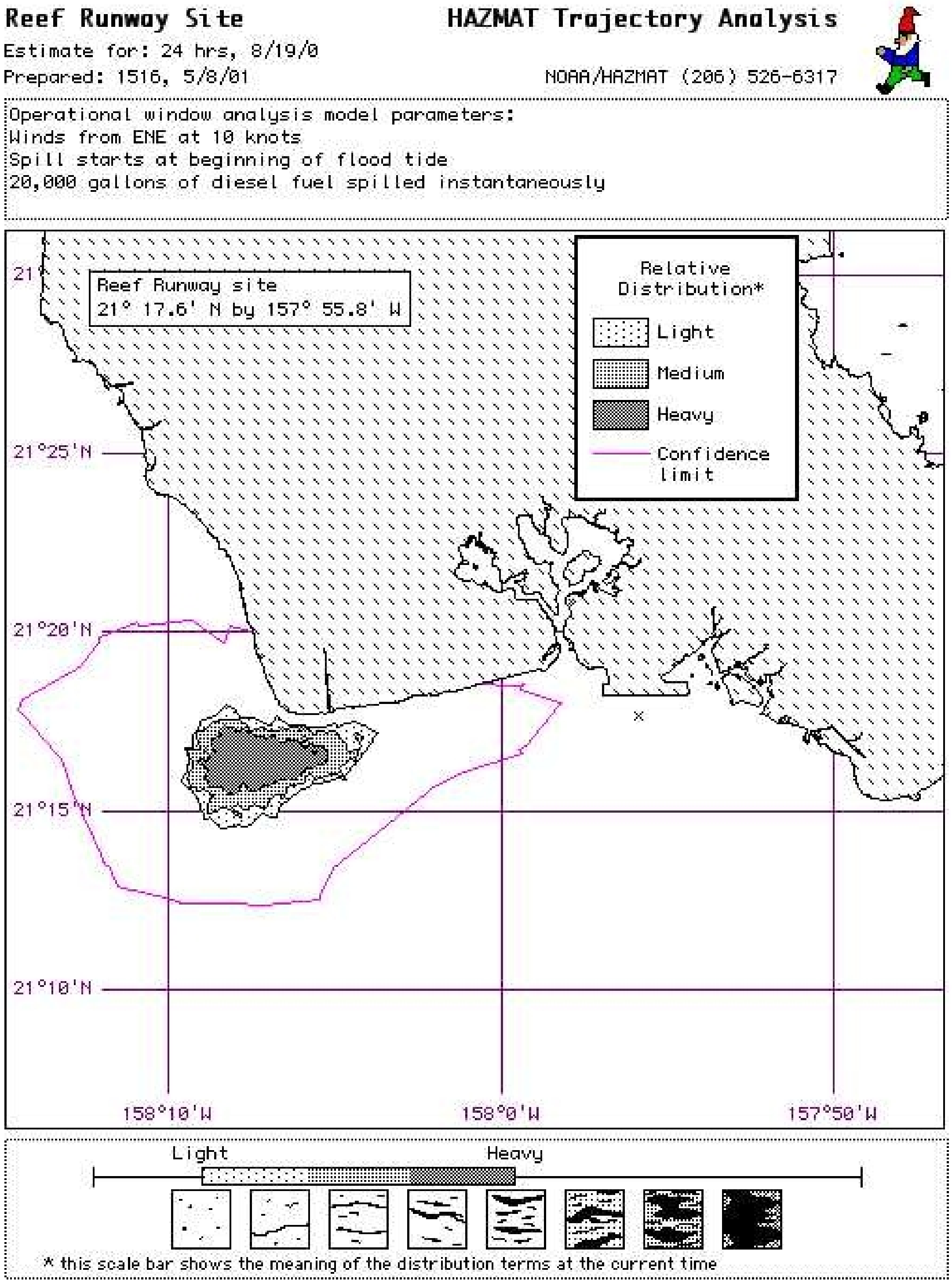


Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds East - Northeast at Ebb Tide

Figure 4-9

No Scale



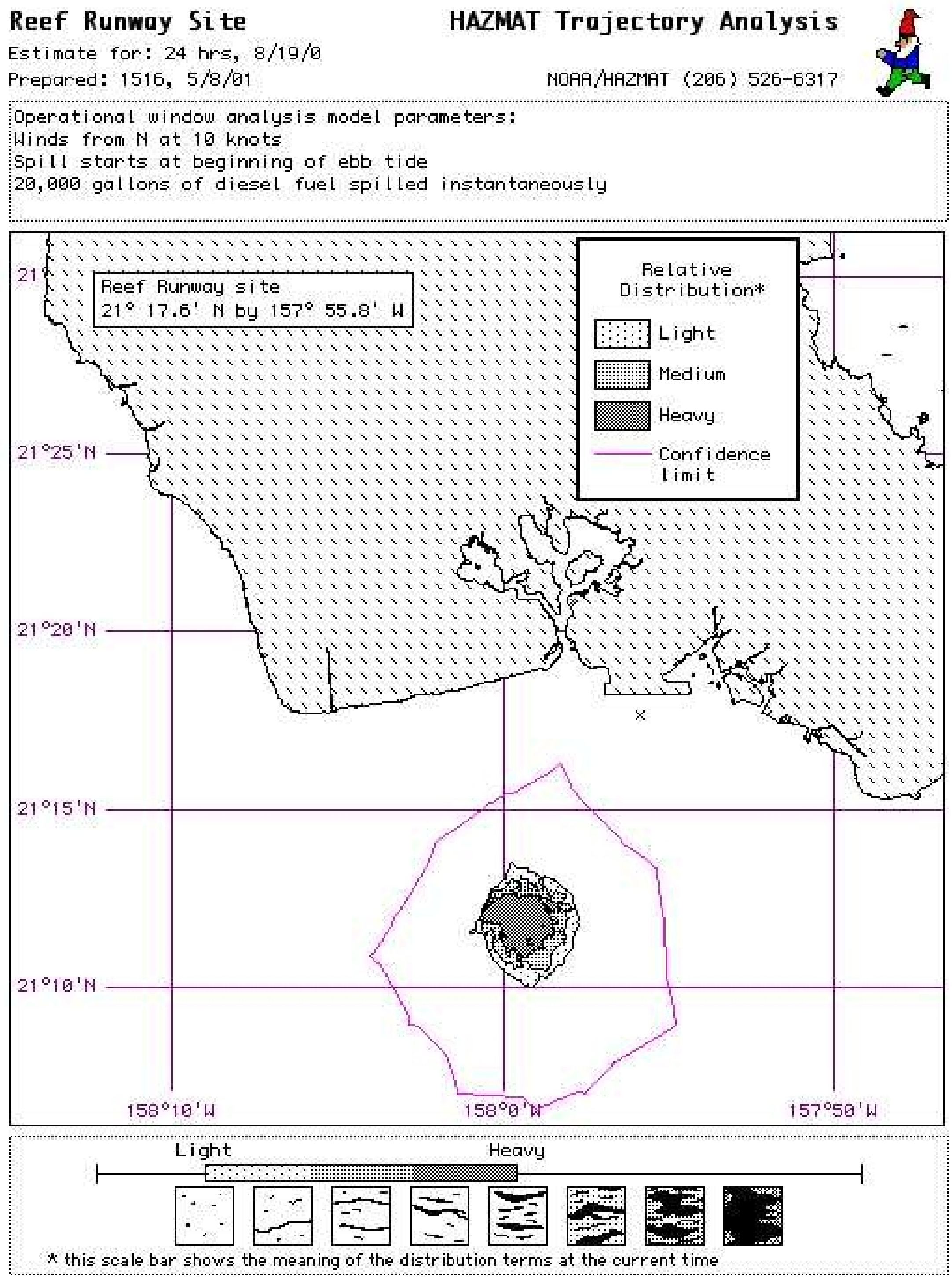
Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds East - Northeast at Flood Tide

Figure 4-10

No Scale

4_10Traj_enef060501



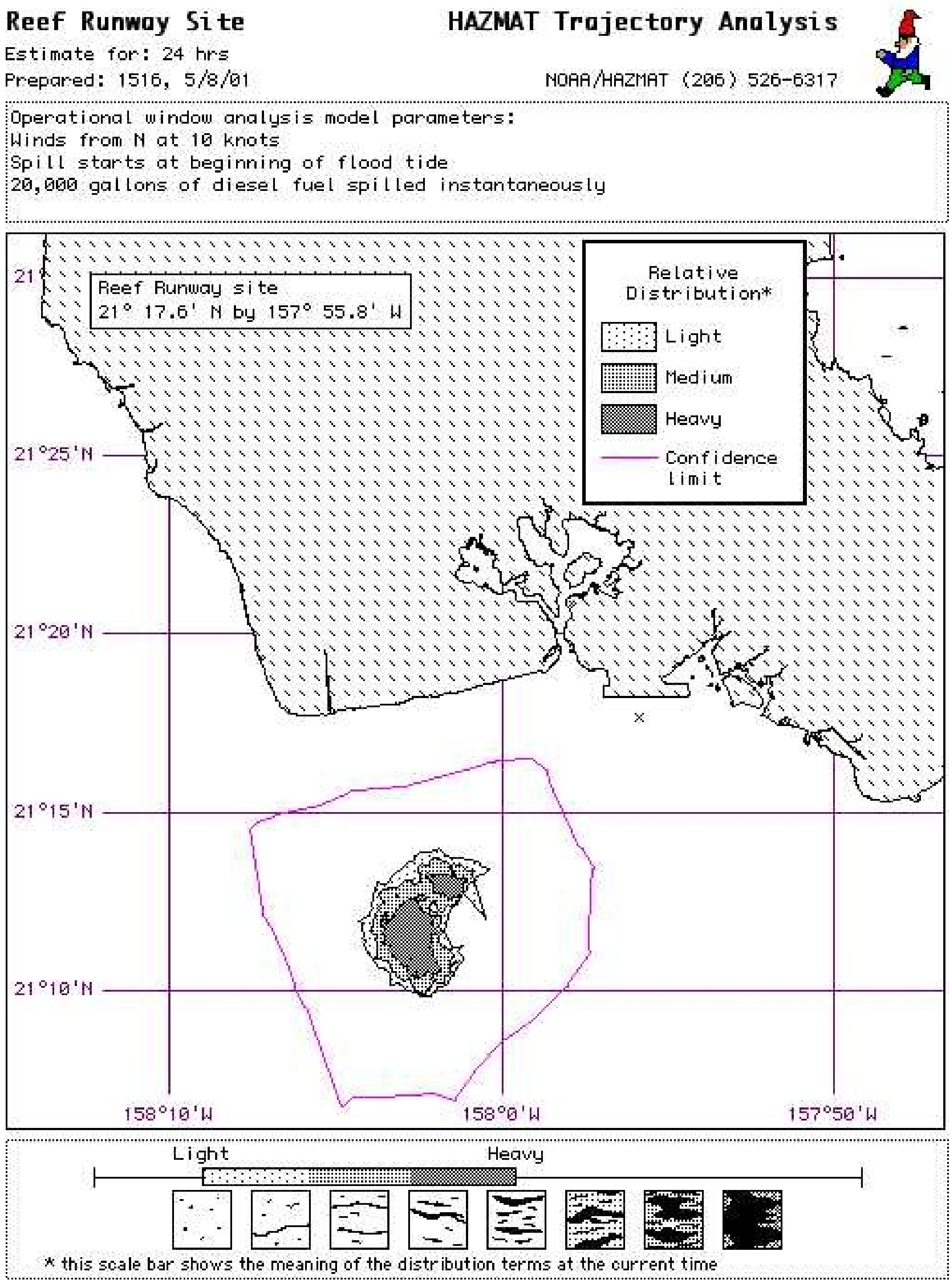
Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds North at Ebb Tide

Figure 4-11

No Scale

4_11Traj_nebb060501

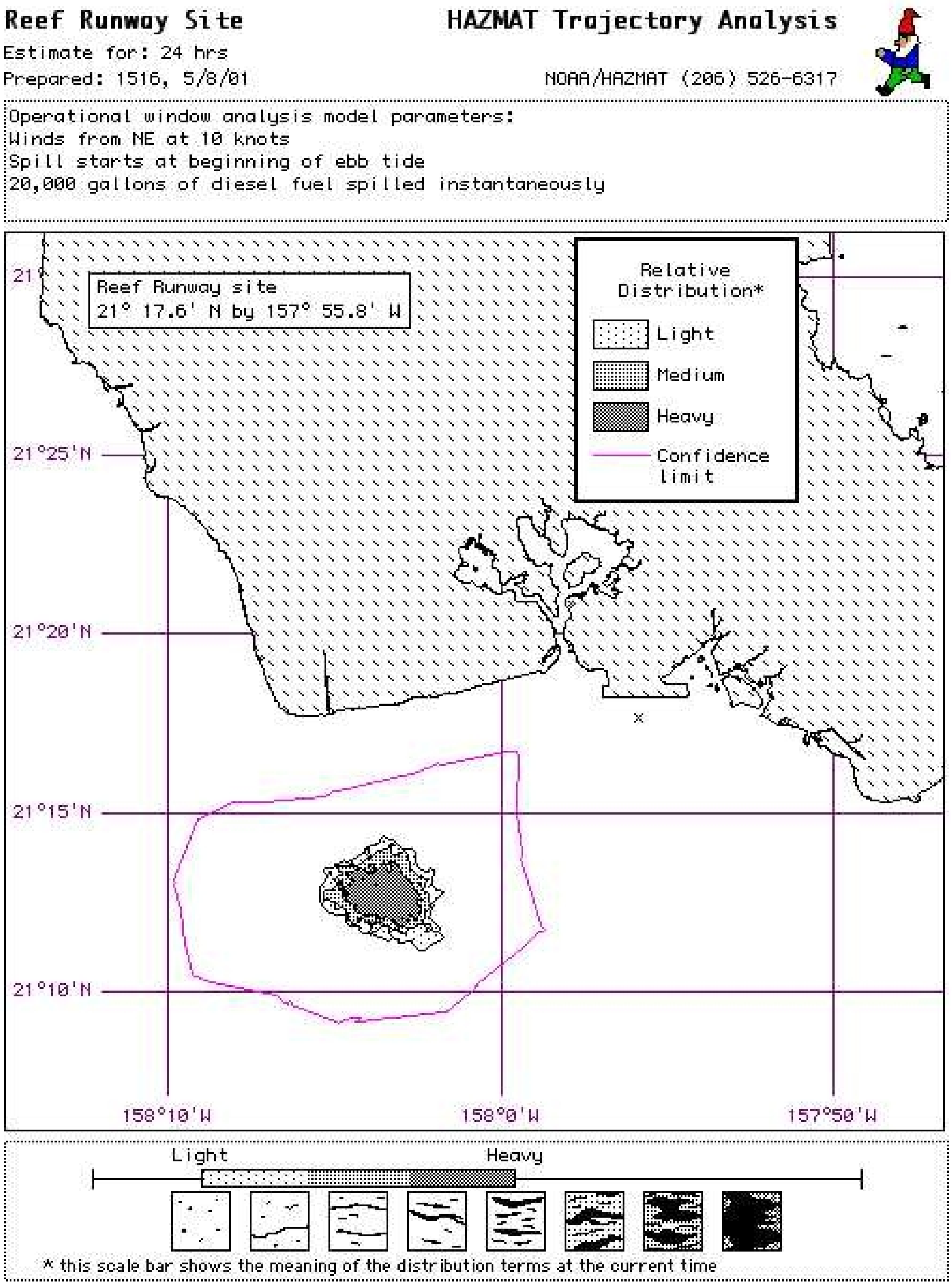


Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds North at Flood Tide

Figure 4-12

No Scale

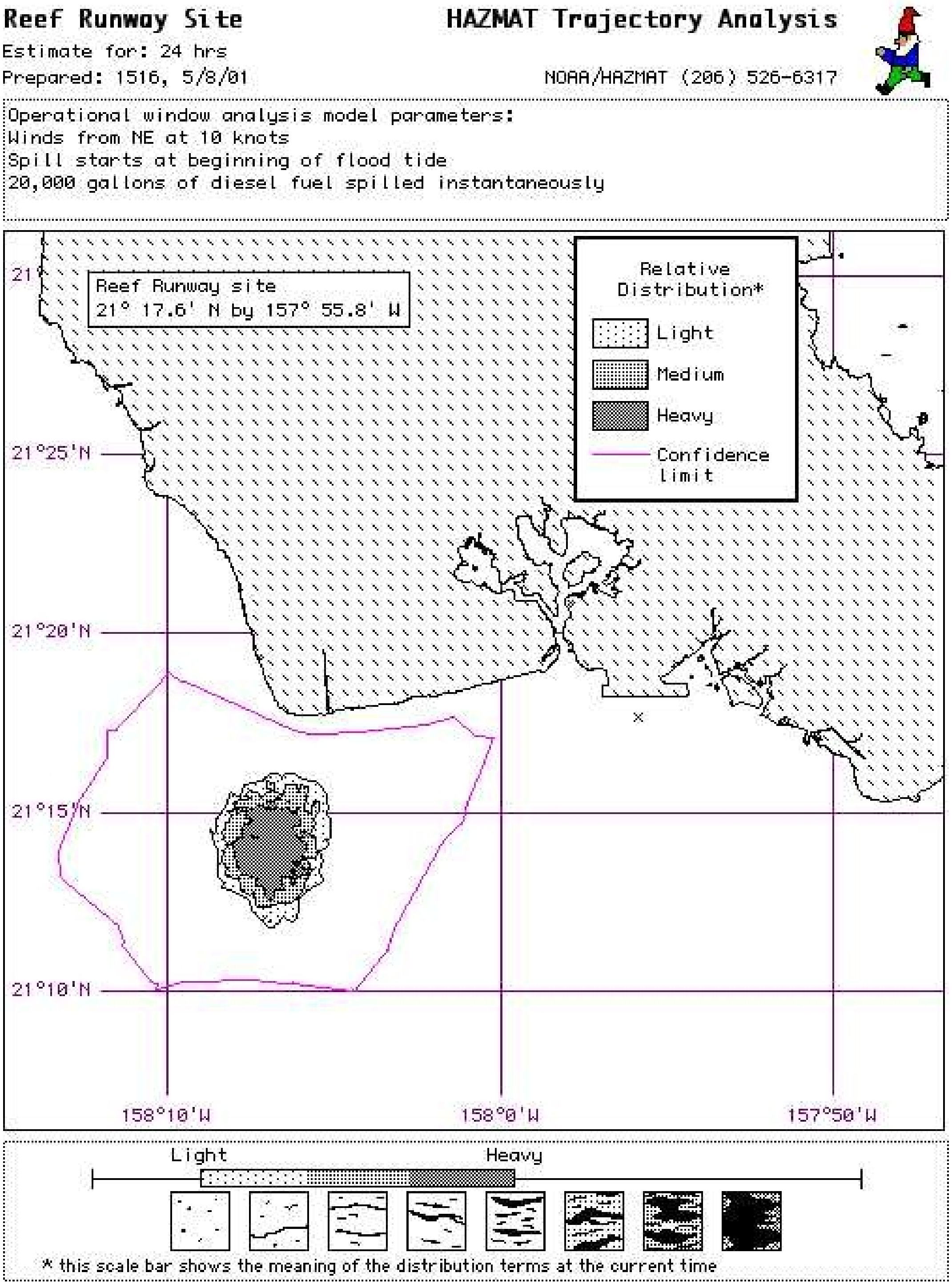


Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds Northeast at Ebb Tide

Figure 4-13

No Scale



Source: National Oceanic and Atmospheric Administration, 2001a; National Climactic Data Center, 2001

HAZMAT Trajectory Analysis - Winds Northeast at Flood Tide

Figure 4-14

No Scale

To ensure favorable wind and current conditions, real-time surface and subsurface current monitoring would occur. This effort would be facilitated by placing data buoys at the edge of the coral fringe 2 to 3 nautical miles (4 to 6 kilometers) from the shallow-water recovery site, and at the shallow-water recovery site to monitor wind speed and direction, air temperature, current speed in the water column, and wave height and period. These buoys would be in place at least 30 days prior to the start of recovery operations and would help ensure that recovery operations that could potentially result in a diesel fuel or lubricating oil release only take place during the most favorable weather conditions for containing a release.

During the transit to the shallow-water recovery site, the heavy-lift vessel would hold at a location approximately 3 nautical miles (6 kilometers) from the site and wait for optimal sea and weather conditions before proceeding. This would minimize the potential for any diesel fuel or lubricating oil releases to be pushed toward the shore. The transit, which would occur during daylight hours, may occur when east winds are blowing; however, this would only happen if other sea conditions and mechanical intervention systems are optimized and thus potential impacts to the environment from a diesel fuel or lubricating oil release are minimized.

4.4.1.3 Reef Runway Shallow-water Recovery Site

The proposed actions relative to the shallow-water recovery site anticipate a low potential for release of diesel fuel and lubricating oil. As described in section 2.1.4.2, in the event of a release, the Navy would have equipment on standby, mobilize the appropriate equipment, and implement the procedures to quickly contain and clean up the release. In addition, aircraft overflights would be continued during the diving operations to monitor for a diesel fuel or lubricating oil release if ongoing operations indicate a higher likelihood of a diesel fuel or lubricating oil release (Naval Sea Systems Command, 2001a).

The environmental impact of a diesel fuel or lubricating oil release is generally greater in shallow, nearshore waters than at the offshore, deep-water relocation site. The proximity to sensitive nearshore resources is a concern, but the immediate environmental impact of released diesel fuel or lubricating oil is minimal compared with true shallow water depths (of a few feet or less). Both mechanical recovery and dispersant operations are viable options; however, the urgency of response would be greater closer to shore. With appropriate approvals, and assuming agreement as to net environmental benefit as well as approval by the Federal OSC, any diesel fuel or lubricating oil not immediately recovered by surface fuel oil skimmers close to the source could be immediately dispersed by dispersant systems as required, though this measure is unlikely. (Naval Sea Systems Command, 2001a) Helicopters would be used to assist in determining the movement of the release on the water surface to ensure appropriate boom placement. Because of the procedures and equipment to contain and clean up an unanticipated diesel fuel or lubricating oil release, only minimal impacts to the environment would be expected.

Near the shallow-water recovery site there is the potential for public and commercial use activities. These activities include netting, fishing, tropical fish collecting, surfing, scuba diving, paddling, kayaking, aquaculture, and shelling. Section 3.3 provides an overview of these resources. Every effort would be taken to contain and clean up any release such that no diesel fuel or lubricating oil would impact the shoreline. The diesel fuel and lubricating oil release response outlined previously would be implemented to protect these sensitive resources; therefore, it is anticipated that there would be minimal impact to these resources from a release.

The vessel cleanup operation would occur while the ship is at the shallow-water recovery site. As safety allows, the hazardous material removal would be completed before *Ehime Maru*'s departure from the shallow-water recovery site. Diesel fuel, lubricating oil, and known hazardous materials removal would take place subsequent to crewmember recovery and personal effects surveys after *Ehime Maru* has been relocated into shallow water for dive operations. During the removal operation, hazardous materials that may affect the marine environment would be removed to the maximum extent practicable taking into account diver and equipment operator safety. The removal action would include:

- Removal of diesel fuel and lubricating oil product
- Securing of pipes, tanks, pumps, and fittings
- Removal of other hazardous materials

Because of the hazardous nature of the operation, it is unlikely that attempts to remove freon would be attempted. *Ehime Maru* does not contain any known asbestos or PCBs.

4.4.1.4 Transit to the Deep-water Relocation Site

Once the removal action is complete, *Ehime Maru* would again be transported underwater because of structural integrity concerns. As noted in section 4.3 (Health and Safety), appropriate safety procedures would be taken to minimize health and safety risks during transport. The transit to the deep-water relocation site would present low risk to the environment because most of the hazardous materials such as diesel fuel and lubricating oil would have been removed during the recovery activities and the vessel compartments would have been sealed. However, because there is the potential that not all of the diesel fuel and lubricating oil would be removed during the recovery effort, skimmer vessels would be on standby, and periodic aircraft overflights would occur. The transit route to the deep-water relocation site would avoid the South Oahu Ocean Dredged Material Disposal Site. (Tourresan and Gardner, 2000) Because of the procedures and equipment that would be in place, no adverse impacts would be expected.

4.4.1.5 Deep-water Relocation Site

Before moving *Ehime Maru* to this location, the Navy would attempt to remove most of the hazardous materials to minimize impacts on the environment. Given that most of the hazardous materials would be removed, the vessel's compartments would be sealed, and the depth of the relocation site at 1,000 fathoms (1,800 meters), no impact to the environment would be expected.

If not all of the diesel fuel and lubricating oil is removed during the recovery effort, there is the potential for some small releases at the deep-water relocation site. Diesel fuel and lubricating oil released would be subject to the weathering processes described in section 4.1, Water Quality. It is expected the release would be at a slow rate and anticipated to disperse in the water during movement from the seafloor and not form a noticeable release that would affect the environment.

4.4.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, the recovery operation would not be initiated and *Ehime Maru* would be left in its current location and present condition. This alternative would not allow for the recovery of potentially remaining hazardous materials that could affect the environment; however, under this alternative the potential for a release close to shore would be minimized because the ship would not be moved.

4.5 AIRSPACE

This section describes the potential impacts to airspace as a result of the relocation and recovery activities. These activities would require the implementation of a temporary flight restriction area that could affect airspace.

4.5.1 PROPOSED ACTION

The Navy would request the FAA to impose a temporary flight restriction in the airspace above the recovery operations. The temporary flight restriction, allowed by federal aviation regulations, would prevent an unsafe congestion of sightseeing aircraft above the lifting operation. It would also minimize the risk that aircraft noise would interfere with communications on the decks of vessels involved in the operation. A NOTAM would be requested to alert pilots of the temporary flight restrictions. The NOTAM would contain specific information for pilots, including the location, effective period, and exact area and altitudes affected. The NOTAM would also include the FAA coordination facility and commercial telephone number, the telephone number of the U.S. Navy office directing the recovery operations, and any other information considered appropriate by the Honolulu Control Facility.

Aircraft under Honolulu Control Facility’s control would be directed around the temporary flight restriction. Aircraft would be allowed through the temporary flight restriction if it becomes impractical for aircraft operating to or from an airport within the area to go above or around it.

The discussion that follows addresses the airspace impacts of the temporary flight restriction above the different phases of the recovery operation.

4.5.1.1 Current Location

Controlled/Uncontrolled Airspace

For operations at the current location, the temporary flight restriction would be from the water surface to an altitude of 2,000 feet (610 meters) and cover an area with a radius of 3 nautical miles (approximately 6 kilometers). As indicated in chapter 3, this temporary flight restriction would be in an area of uncontrolled airspace below 700 feet (213 meters) above the surface, but in controlled airspace above 700 feet (213 meters). Establishment of the temporary flight restriction and release of the NOTAM would effectively control the airspace above the operation. It would temporarily change the nature of the airspace above the current location, but would not adversely impact navigable airspace in the ROI.

Enroute Airways

The current location lies to the west of the two low altitude enroute airways in the ROI. Therefore, establishment of the temporary flight restriction would not require either a change to an existing or planned flight course or altitude.

Airports and Airfields

There are no airports or airfields in the ocean area ROI. Consequently, activities at the current location would have no impacts on airfields and/or airports.

4.5.1.2 Transit to the Shallow-water Recovery Site

There are small differences in the nature of the overlying airspace ROI, as identified in chapter 3.

Controlled/Uncontrolled Airspace

For operations during transit to the shallow-water recovery site, the temporary flight restriction would be from the surface to an altitude of 2,000 feet (610 meters with a 1-nautical-mile (approximately 2-kilometer) radius moving from the current location to the shallow-water recovery site. As indicated in chapter 3, this temporary flight restriction would start in an area of uncontrolled airspace below 700 feet (213 meters) above the surface, but in controlled airspace above 700 feet (213 meters).

Establishment of a temporary flight restriction along this transit route and issuance of the NOTAM would effectively control the airspace above the operation. Although the temporary flight restriction would temporarily change the nature of the airspace above the transit route, the temporary flight restriction would not adversely impact navigable airspace in the ROI.

Enroute Airways

Although there are a number of low altitude enroute airways that cross over the transit route, aircraft flying in them would be well above the transit operation and the overlying temporary flight restriction. As the transit route approaches the coast of Oahu, aircraft flying in the low altitude airways change from this network of airways to follow approach procedures given by Honolulu Control Facility. Arriving aircraft would follow flight path procedures that would either be well above the transit route, or avoid it altogether. Departing aircraft would avoid the transit route operations close to the coast, or would be well above them before joining the network of low altitude airways.

Therefore, establishment of the temporary flight restriction over the transit corridor would not require either a change to an existing or planned Instrument Flight Rules minimum flight altitude, a published or special instrument procedure, or an Instrument Flight Rules departure procedure. Neither would the establishment of a temporary flight restriction require a Visual Flight Rules operation to change from a regular flight course or altitude. Consequently, no impacts to the surrounding low altitude airways would occur.

Airports and Airfields

There are no airports or airfields in the transit route ROI. The temporary flight restriction that would be established for operations in the transit corridor would therefore have no impacts on airfields or airports.

4.5.1.3 Reef Runway Shallow-water Recovery Site

Reef Runway Shallow-water Recovery Site

Controlled/Uncontrolled Airspace

All aircraft flying within the inner "core" area of Honolulu's airspace, which surrounds the Reef Runway shallow-water recovery site, operate under Honolulu Control Facility directions. The Navy may request the FAA to impose a temporary flight restriction in the airspace above the recovery operations from the surface to 2,000 feet (610 meters) with a 1-nautical-mile (2-kilometer) radius.

Enroute Airways

There are no enroute low altitude airways in the airspace above the Reef Runway shallow-water recovery site. Arriving aircraft change from the network of airways to their final approach patterns to Honolulu International Airport, and departing aircraft follow established departure procedures. All aircraft in the overlying airspace would be under the control of Honolulu Control Facility. Arriving aircraft would follow flight path procedures that would either be well above the Reef Runway shallow-water recovery site, or avoid it altogether. Departing aircraft would avoid the Reef Runway shallow-water recovery site just off the runway at Honolulu International Airport, or would be well above the site before joining the network of low altitude airways. Therefore, a temporary flight restriction would not impact the ROI's enroute airways.

Airports and Airfields

Honolulu International Airport is immediately to the north of the Runway Reef shallow-water recovery site. The crane involved in the shallow-water recovery site operation would not be in the runway obstacle free zones. These are three-dimensional volumes of airspace that protect aircraft arriving and departing from the runway. Therefore, the crane would not constitute an obstruction to air navigation. In addition, appropriate safety lighting would be used on top of the crane. Thus, the Reef Runway shallow-water recovery operations would not affect the use of any airfield or airport available for public use, and would not substantially affect airfield or airport arrival and departure traffic flows.

4.5.1.4 Transit to the Deep-water Relocation Site

A temporary flight restriction with a 1-nautical-mile (approximately 2-kilometer) radius would be established along the transit route. The temporary flight restriction would extend up to an altitude of 2,000 feet (610 meters). The Navy would request dedicated warning NOTAMs be issued to warn the public of the potentially hazardous activities. There would be no adverse impacts to controlled/uncontrolled airspace, to enroute low altitude airways, and/or to airports or airfields along the transit route.

4.5.1.5 Deep-water Relocation Site

Controlled/Uncontrolled Airspace

For operations at the deep-water relocation site, the temporary flight restriction would be from the surface to an altitude of 2,000 feet (610 meters), and cover an area with a radius of 3 nautical miles (6 kilometers). As indicated in chapter 3, the temporary flight restriction would be in an area of uncontrolled airspace between the surface and an altitude of 700 feet (213 meters), but in controlled airspace above an altitude of 700 feet (213 meters). Establishment of the temporary flight restriction and release of the NOTAM would effectively control the airspace above the operation. It would temporarily change the nature of the airspace above the deep-water relocation site, but would not adversely impact navigable airspace.

Enroute Airways

The deep-water relocation site lies to the west of the one low altitude enroute airway in the ROI. Therefore, establishment of a temporary flight restriction area would not require aircraft flying in the airway to change course or flight altitude and would not impact enroute airways.

Airports and Airfields

There are no airports or airfields in the ROI of the deep-water relocation site; therefore, there would be no impacts.

4.5.2 RECOVERY-NOT-POSSIBLE ALTERNATIVE

Under this alternative, no temporary flight restriction would be required. Consequently, there would be no impacts to controlled/uncontrolled airspace, enroute low altitude airways, or airports or airfields in the general airspace use ROI.

4.6 CUMULATIVE IMPACTS

The proposed recovery effort would occur over a 3-month period. Because the project would be short term and steps would be taken to minimize impacts, no cumulative impacts would be expected with other actions or environmental concerns in the ROI. Although an unanticipated diesel fuel or lubricating oil release could occur and add to other water quality or aquaculture concerns in the area, every precaution would be taken to minimize the environmental impact of the release. In addition, any release would be short term and would not result in any long-term cumulative impacts to the environment.

No cumulative impacts have been identified for the Recovery-not-possible Alternative.

4.7 MITIGATION MEASURES

The Navy has made every effort to minimize the potential for significant environmental impacts. During the development of the EA, the Navy worked with resource agencies to determine the locations to conduct recovery activities that would have a minimal impact on the environment.

Unavoidable impacts overall are anticipated to be minor and would be minimized by implementation of standard best management practices and planned contingency responses to unanticipated releases; therefore no compensatory mitigation measures would be required. Should there be an unanticipated significant impact, the Navy and resource trustees would develop compensation commensurate with the level of impacts.

4.8 ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Other than the potential for some short-term disturbance to marine resources and the temporary unanticipated release of diesel fuel or lubricating oil, there would be no long-term adverse impacts that could not be avoided. All unanticipated releases of diesel fuel or lubricating oil during recovery operations would be prepared for and responded to with mechanical and, if approved and appropriate, dispersant capabilities.

4.9 CONSISTENCY WITH FEDERAL, REGIONAL, STATE, LOCAL, OR NATIVE AMERICAN LAND-USE PLANS, POLICIES, AND CONTROLS

Neither the Proposed Action nor the Recovery-not-possible Alternative would conflict with any land use plans, policies, or controls. All necessary permits to conduct the activities would be obtained before the initiation of the project.

4.10 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

The Proposed Action would require the use of a limited amount of fuel to conduct the recovery effort. During recovery activities, conservation measures would be implemented to the extent practicable, taking into account safety requirements.

4.11 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The Proposed Action would use a limited amount of fuel during recovery activities. Overall, there would be a limited amount of irreversible or irretrievable commitment of resources.

4.12 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE HUMAN ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Given the short-term nature and minimal disturbance to the environment of the Proposed Action, there would be no impacts to long-term productivity. There would be no impacts under the Recovery-not-possible Alternative except for the long-term potential for a slow-rate diesel fuel or lubricating oil release.

4.13 NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS AND CONSERVATION POTENTIAL

Other than fuel and oil, no significant natural or depletable resources would be required.

5.0
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5.0 REFERENCES

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6.0
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6.0 LIST OF PREPARERS

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7.0
AGENCIES CONTACTED

7.0 AGENCIES CONTACTED

FEDERAL AGENCIES

National Oceanic and Atmospheric Administration

- National Marine Fisheries Service
- Office of Response and Restoration (HazMat)
- National Climatic Data Center, Asheville, North Carolina
- National Weather Service, Honolulu International Airport
- Office of Coast Survey, Pacific Hydrographic Branch

U.S. Army Corps of Engineers, Honolulu District

U.S. Coast Guard

U.S. Environmental Protection Agency

U.S. Fish and Wildlife Service

U.S. Marine Corps

Federal Aviation Administration

FOREIGN GOVERNMENT AGENCIES

Consulate General of Japan

STATE AGENCIES

Hawaii

Attorney General

Coastal Zone Management Office

Department of Health

Department of Land and Natural Resources

- Division of Aquatic Resources

Department of Transportation

- Airports Division

Office of Environmental Quality Control

Office of the Governor

Department of Business, Economic Development, & Tourism

- Department of Planning

State Historic Preservation Office

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APPENDIX A
DISTRIBUTION LIST

APPENDIX A
DISTRIBUTION LIST

FEDERAL AGENCIES

National Oceanic and Atmospheric Administration

- National Marine Fisheries Service
- Office of Response and Restoration (HAZMAT)

U.S. Army Corps of Engineers, Honolulu District

U.S. Coast Guard

U.S. Environmental Protection Agency

U.S. Fish and Wildlife Service

U.S. Marine Corps

Federal Aviation Administration

FOREIGN GOVERNMENT AGENCIES

Consulate General of Japan

STATE AGENCIES

Hawaii

Attorney General

Coastal Zone Management Office

Department of Health

Department of Land and Natural Resources

- Division of Aquatic Resources

Department of Transportation

- Airports Division

Office of Environmental Quality Control

Office of the Governor

Department of Business, Economic Development, & Tourism

- Department of Planning

State Historic Preservation Office

LIBRARIES

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Honolulu, Hawaii

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Kailua Public Library
Honolulu, Hawaii

Kaimuki Public Library
Honolulu, Hawaii

Pearl City Public Library
Honolulu, Hawaii

Salt Lake/Moanalua Public Library
Honolulu, Hawaii

Waianae Public Library
Honolulu, Hawaii

Waikiki-Kapahulu Public Library
Honolulu, Hawaii

Waipahu Public Library
Honolulu, Hawaii

University of Hawaii
Hamilton Library
Honolulu, Hawaii

APPENDIX B
CORRESPONDENCE

FLEET MAINTENANCE OFFICER
COMMANDER IN CHIEF
U.S. PACIFIC FLEET
PEARL HARBOR, HAWAII 96860-7000

23 April 2001

Dear Mr. Karnella,

As you are aware, the U.S. Navy is preparing the required environmental documentation for the relocation of the Ehime Maru for recovery of the lost crew members and their personal effects. We are doing so with the participation of the Japanese government, and in close coordination and with full and active participation and support from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service.

In furtherance of this effort, and in compliance with Section 7 of the Endangered Species Act, we request a list of threatened and endangered species that you consider to be of concern in the areas where the Proposed Action i to take place. The areas include the location where the Ehime Maru went down (about nine miles south of Diamond Head) and from which it will be relocated; the corridors to potential berthing sites for recovery of crew members and their effects; the potential berthing sites (Reef runway 21 17.6N / 157 55 .8W; Leeward Coast - PH

Channel to Barber's Point 21 17.5 N /158 00.8 W; Oahu - Waianae Coast 21 19.8 N / 158 08.3 W; Penguin Banks 20 53.5 N / 157 45.0 W; Southwest Molokai 21 05.0 N / 157 17.0 W); and the corridor to the proposed relocation site for the vessel (21 05N / 158 06 W).

In addition, we would also like to request a list of marine mammals that may be expected to occur in the areas outlined above and that are of concern to your agency under the Marine Mammal Protection Act.

These lists are being requested in order to quickly initiate an informal consultation process and expedite receipt of a concurrence letter, Biological Opinion, or memorandum of understanding regarding the potential impacts to any listed species.

I would like to thank you in advance for your expeditious handling of this request.

Sincerely,

WRKlemm

W. R. KLEMM
Rear Admiral, U.S. Navy

Ms. Barbara Maxfield, Acting Director
U.S. Fish and Wildlife Service
Pacific Islands Ecoregion
P.O. Box 50088
300 Ala Moana Blvd. Rm. 3108
Honolulu, Hawaii, 96850

Copy to:
Mr. John Naughton
Pacific Islands Area Office
National Marine Fisheries Service
Southwest Region
1601 Kapiolani Boulevard, Suite 1110
Honolulu, HI 96814-4700

Ms. Margaret Dupree
Pacific Islands Area Office
National Marine Fisheries Service
Southwest Region
1601 Kapiolani Boulevard, Suite 1110
Honolulu, Hi 96814-4700

FLEET MAINTENANCE OFFICER
COMMANDER IN CHIEF
U.S. PACIFIC FLEET
PEARL HARBOR, HAWAII 96860-7000

23 April 2001

Dear Mr. Karnella,

As you are aware, the U.S. Navy is preparing the required environmental documentation for the relocation of the Ehime Maru for recovery of the lost crew members and their personal effects. We are doing so with the participation of the Japanese government, and in close coordination and with full and active participation and support from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service.

In furtherance of this effort, we request any available data, or information your agency may have on designated Essential Fishery Habitat that you consider to be of concern in the areas where the Proposed Action is to take place. The areas include the location where the Ehime Maru went down (about nine miles south of Diamond Head) and from which it will be relocated, the corridors to potential berthing sites for recovery of crew members and their effects, the potential berthing sites (Reef runway 21 17.6N / 157 55 .8W; Leeward Coast - PH Channel to

Barber's Point 21 17.5 N /158 00.8 W; Oahu - Waianae Coast 21 19.8 N / 158 08.3 W; Penguin Banks 20 53.5 N / 157 45.0 W; Southwest Molokai 21 05.0 N / 157 17.0 W); and the corridor to the proposed deepwater relocation site for the vess (21 05N / 158 06 W).

In addition, we also request some examples of Essential Fishery Habitat analyses that have been included in recent environmental documentation in the Hawaiian waters in general and in the areas outlined above specifically. Any assistance and guidance your agency can provide in addressing the Essential Fishery Habitat issue would be greatly appreciated.

I would like to thank you in advance for your expeditious handling of this request.

Sincerely,

W. R. KLEMM
Rear Admiral, U.S. Nav

Mr. Charles Karnella
Southwest Region Administrator,
Pacific Islands Area Office,
National Marine Fisheries Service
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii, 96814-4700

Copy to:
Mr. John Naughton
Pacific Islands Area Office
National Marine Fisheries Service
Southwest Region
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FLEET MAINTENANCE OFFICER
COMMANDER IN CHIEF
U.S. PACIFIC FLEET
PEARL HARBOR, HAWAII 96860-7000

23 April 2001

Dear Ms. Maxfield:

As you are aware, the U.S. Navy is preparing the required environmental documentation for the relocation of the Ehime Maru for recovery of the lost crew members and their personal effects. We are doing so with the participation of the Japanese government, and in close coordination with, and full and active participation and support from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

In furtherance of this effort, and in compliance with Section 7 of the Endangered Species Act, we request a list of threatened and endangered species that you consider to be of concern in the areas where the Proposed Action is to take place. The areas include the location where the Ehime Maru went down (about nine miles south of Diamond Head) and from which it will be relocated, the corridors to potential berthing sites for recovery of crew members and their effects, the potential berthing sites (Reef runway 21 17.6N / 157 55 .8W; Leeward Coast - PH Channel to Barber's Point 21 17.5 N /158 00.8 W; Oahu - Waianae Coast 21 19.8 N / 158 08.3 W;

Penguin Banks 20 53.5 N / 157 45.0 W; Southwest Molokai 21 05.0 N / 157 17.0 W), and the corridor to the proposed deepwater relocation site for the vessel (21 05N / 158 06 W).

This list is being requested in order to quickly initiate an informal consultation process and expedite receipt of a concurrence letter, Biological Opinion, or memorandum of understanding regarding the potential impacts to any listed species.

I would like to thank you in advance for your expeditious handling of this request.

Sincerely,

W. R. Klemm

W. R. KLEMM
Rear Admiral, U.S. Navy

Ms. Barbara Maxfield, Acting Director
U.S. Fish and Wildlife Service
Pacific Islands Ecoregion
P.O. Box 50088
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Honolulu, Hawaii, 96850

Copy to:
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Honolulu, HI 96813

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

W.R. Klemm
Rear Admiral, U.S. Navy
Fleet Maintenance Officer
Commander in Chief
U.S. Pacific Fleet
Pearl Harbor, Hawaii 96860-7000

April 30, 2001

Dear Admiral Klemm,

This responds to your request received April 25, 2001, for a list of threatened and endangered species that may be found in the areas of the proposed action to relocate the Ehime Maru for recovery of crew members and their effects. We provide the following information under our statutory authorities under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq*., and the Marine Mammal Protection Act of 1972, as amended 16 U.S.C. 1361 *et seq.* (MMPA). The following is a list of protected species that may be found in all of the possible berthing sites including, Oahu-Reef Runway (21 17.6N/157 55.8W); Oahu-Leeward Coast, Pearl Harbor Channel to Barbers Point (21 17.5N/158 00.8W); Oahu-Waianae Coast (21 19.8N/158 08.3W); Molokai-Penguin Banks (20 53.5N/157 45.0W); Molokai-Southwest Molokai (21 05.0N/158 06W); and the corridor to the proposed relocation site (21 05N/158 06W). These species may also be found in the area where the Ehime Maru is currently located, about nine miles south of Diamond Head, Oahu.

Threatened green turtles (*Chelonia mydas*), and endangered hawksbill turtles (*Eretmochelys imbricata*) occur in the waters off of Oahu and Molokai. Endangered humpback whales (*Megaptera novaeangliae*) are found offshore during the winter breeding season (December-May). Endangered sperm whales (*Physeter macrocephalus*) are found offshore of Oahu and Molokai year round. Endangered Hawaiian monk seals (*Monachus schauinslandi*) are also found in the nearshore waters and beaches of Oahu and Molokai.

Additionally, all marine mammals are protected under the Marine Mammal Protection Act of 1972, as amended, 16 U.S.C. 1361 *et seq.*(MMPA). Marine mammals occurring in the waters off Oahu and Molokai include:

Bryde's whale (*Balaenoptera edeni*)
Cuvier's beaked whale (*Ziphius cavirostris*)
Pygmy sperm whale (*Kogia breviceps*)
Dwarf sperm whale (*Kogia simus*)

Melon-headed whale (*Peponocephala electra*)
Pygmy killer whale (*Feresa attenuata*)
False killer whale (*Pseudorca crassidens*)
Killer whale (*Orcinus orca*)
Short finned pilot whale (*Globicephala macrorhynchus*)
Spinner dolphins (*Stenella longirostris*)
Striped dolphin (*Stenella coeruleoalba*)
Pantropical spotted dolphin (*Stenella attenuata*)
Common dolphin (*Delphinus delphis*)
Risso's dolphin (*Grampus griseus*)

The National Marine Fisheries Service (NMFS) will continue its coordination with the U.S. Navy during this effort. Should you have further questions regarding protected species in waters around Hawaii and/or the section 7 process, please contact Margaret Dupree at (808) 973-2937 or fax (808) 973-2941.

Sincerely,

C. Kameel

Rebecca Lent, Ph.D.
Regional Administrator

cc: Leona Stevenson
Randy Gallien

BENJAMIN J. CAYETANO
GOVERNOR

SEIJI F. NAYA, Ph.D.
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Telephone: (808) 587-2846
Fax: (808) 587-2824

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Ref. No. P-9085

May 11, 2001

Mr. George Young
Chief, Regulatory Branch
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858-5440

Attention: Ms. Lolly Silva

Dear Mr. Young:

Subject: Hawaii Coastal Zone Management (CZM) Program Review for Relocating the Ehime Maru, South Oahu, Department of the Army Permit File No. 200100303

The Hawaii CZM Program has reviewed the U.S. Navy proposal to relocate the Ehime Maru from its present location on the seafloor at a depth of 2,000 feet, 8 nautical miles south of Oahu, to a location 0.5 - 0.75 nautical miles south of the Honolulu Airport Reef Runway. It is our understanding that the shallow water location is temporary and will facilitate recovery of crew members missing since a collision with the USS Greeneville and subsequent sinking on February 9, 2001. Also, residual fuel and oil will be removed and the ship prepared for deep water disposal. On this basis, we do not have any objections to the proposal.

Thank you for consulting with our CZM Program. If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

Sincerely,

David W. Blane, AICP
Director
Office of Planning

c: Randy Gallien, U.S. Army Space & Missile Defense Command
U.S. National Marine Fisheries Service, Pacific Area Office
U.S. Fish and Wildlife Service, Pacific Islands Ecoregion
Wendy Wiltsie, U.S. Environmental Protection Agency
Department of Health, Clean Water Branch
Department of Land & Natural Resources,
Planning & Technical Services Branch
Department of Planning and Permitting, City & County of Honolulu

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

In Reply Refer To: CMH

W. R. Klemm
Rear Admiral, U.S. Navy
Commander in Chief
U.S. Pacific Fleet
Pearl Harbor, Hawaii 96860-7000

MAY 21 2001

Re: Request for Species List for Relocation of the *F/V Ehime Maru*

Dear Rear Admiral Klemm:

On April 23, 2001, the U.S. Fish and Wildlife Service (Service) received your letter requesting a species list for the proposed action of relocating the *F/V Ehime Maru* for recovery of the lost crew members and their personal effects. The proposed action involves movement of the vessel in the following project area: the location where the *F/V Ehime Maru* went down (about nine miles south of Diamond Head) and from which it will be relocated, the corridors to potential berthing sites for recovery of crew members and their effects, the potential berthing sites (Reef runway 21 17.6 N / 157 55.8 W; Leeward Coast - PH Channel to Barber's Point 21 17.5 N / 158 00.8 W; Oahu - Waianae Coast 21 19.8 N / 158 08.3 W; Penguin Banks 20 53.5 N / 157 45.0 W; Southwest Molokai 21 05.0 N / 157 17.0 W), and the corridor to the proposed deepwater relocation site for the vessel (21 05 N / 158 06 W).

We have reviewed information contained in your Coordinating Draft Environmental Assessment and in our files, including maps prepared by the Hawaii Natural Heritage Program and the Service's National Wetlands Inventory Program. To the best of our knowledge, the following federally listed species may occur in the project area:

Common Name	Hawaiian Name	Scientific Name	Federal Status
Hawaiian duck	koloa maoli	*Anas wyvilliana*	endangered
Hawaiian coot	alae ke'oke'o	*Fulica alai*	endangered
Hawaiian moorhen	'alae 'ula	*Gallinula chloropus sandvicensis*	endangered
Hawaiian stilt	ae'o	*Himantopus mexicanus knudseni*	endangered
Hawaiian dark-rumped petrel	ua'u	*Pterodroma phaeopygia sandwichensis*	endangered
Newell's shearwater		*Puffinus auricularis newelli*	threatened

In addition to these listed species, the band-rumped storm petrel (*Oceanodroma castro*), a candidate species, may also occur in the project area.

We appreciate the opportunity to provide comments on the proposed project. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Lorena Wada by phone at (808) 541-3441.

Sincerely,

Paul Henson

Paul Henson
Field Supervisor

FLEET MAINTENANCE OFFICER
COMMANDER IN CHIEF
U.S. PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-7000

29 May 2001

Dear Ms. Dupree,

Enclosed for your use and information, please find a copy of the Draft Ehime Maru Environmental Assessment (EA). As you know, threatened and endangered species under the jurisdiction of the National Marine Fisheries Service have been evaluated in the EA with the intent that the EA will stand in for a Biological Assessment (BA).

We are requesting an informal consultation under Section 7 of the Endangered Species Act, with the anticipation of a no affect determination as to potential impacts to the humped-back whale, sperm whale, Hawaiian monk seal, green sea turtle, and hawks-bill sea turtle. The EA indicates the probability of the sea turtle species foraging or resting in the area of the Proposed Action is very low as is the probability of Hawaiian monk seals being in the areas potentially impacted by the recovery and relocation activities. The whale species would not be expected to be in the area of the Proposed Action during the recovery and relocation activities.

With the implementation of the project actions as presented in the EA, the use of Best Management Practices, and implementation of activities outlined in the Incident Action Plan, there will be no affect on any of these marine mammals and sea turtles.

Sincerely,

W. R. KLEMM
Rear Admiral, U.S. Navy

Ms. Margaret Dupree
Pacific Islands Protected Species Program
National Marine Fisheries Service
Pacific Islands Area Office
1601 Kapiolani Boulevard, Suite 1110
Honolulu, Hawaii 96814-4700

FLEET MAINTENANCE OFFICER
COMMANDER IN CHIEF
U.S. PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-7000

29 May 2001

Dear Mr. Everson,

Enclosed for your use and information, please find a copy of the Draft Ehime Maru Environmental Assessment (EA). As you know, Essential Fish Habitat (EFH) under the jurisdiction of the National Marine Fisheries Service have been evaluated in the EA, with the intent that the EFH discussions integrated into the EA will stand in for a more formal EFH discussion that is usually placed in an appendix or a specific section.

We are requesting an informal consultation under the Magnuson-Stevens Act EFH requirements. The analysis in the EA, and the efforts of NMFS, USFWS, and DLNR staff, assisted in the selection of a least damaging alternative location at the Reef Runway shallow-water recovery site to conduct the recovery actions. With the implementation of the project actions as presented in the EA, the use of Best Management Practices, and implementation of activities outlined in the Incident Action Plan, there will be no affect on Essential Fish Habitat.

Sincerely,

W. R. KLEMM
Rear Admiral, U.S. Navy

Mr. Alan Everson
Fisheries Biologist
National Marine Fisheries Service
Pacific Islands Area Office
1601 Kapiolani Boulevard, Suite 1110
Honolulu, Hawaii 96814-4700

FLEET MAINTENANCE OFFICER
COMMANDER IN CHIEF
U.S. PACIFIC FLEET
250 MAKALAPA DRIVE
PEARL HARBOR, HAWAII 96860-7000

29 May 2001

Dear Dr. Henson,

Enclosed for your use and information, please find a copy of the Draft Ehime Maru Environmental Assessment (EA). As you know, threatened and endangered species under the jurisdiction of the U.S. Fish and Wildlife Service have been evaluated in the EA with the intent that the EA will stand in for a Biological Assessment (BA).

We are requesting formal consultation under Section 7 of the Endangered Species Act, with the anticipation of a may affect determination as to potential impacts to two seabirds species (Hawaiian dark-rumped petrel and Newell's shearwater). The EA indicates the probability of Hawaiian dark-rumped petrel and Newell's shearwater foraging in the area of the Proposed Action is very low.

We have concluded that the Proposed Action would not affect waterbirds (Hawaiian black-necked stilt, Hawaiian coot, Hawaiian duck, Hawaiian moorhen). With the implementation of the project actions as presented in the EA, use of Best Management Practices, and implementation of activities outlined in the Incident Action Plan, there will be no affect on any of these four waterbird species.

We appreciate your prompt attention to this matter and your agreement to act by 1 June 2001 in order to support this important action. If we can assist you in this process, please contact LCDR Neil Sheehan at 471-4954.

Sincerely,

W. R. KLEMM
Rear Admiral, U.S. Navy

Dr. Paul Henson
Field Supervisor
U.S. Fish and Wildlife Service
P.O. Box 50088
300 Ala Moana Boulevard
Room 3108
Honolulu, Hawaii 96580

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
Pacific Island Area Office
1601 Kapiolani Boulevard, Suite 1110
Honolulu, Hawaii 96814-0047

May 31, 2001

Fleet Maintenance Officer
Commander in Chief
U.S. Pacific Fleet
250 Makalapa Drive
Pearl Harbor, HI 96860-7000

Dear Admiral Klemm:

The National Marine Fisheries Service (NMFS) has reviewed the Ehime Maru Draft Environmental Assessment (EA). The purpose of the proposed action is the safe recovery of the crew members, personal effects, and certain unique characteristic components from the *Ehime Maru*. Action areas evaluated include the current location of the vessel at a depth of approximately 2,000 feet, 9 nautical miles south of Diamond Head, the preferred shallow water recovery site located 0.5 to 0.75 nautical miles offshore of the Honolulu Airport reef runway at a depth of approximately 115 ft, and a deep-water relocation site outside of State waters at a depth in excess of 6,000 ft. This letter is provided in accordance with Section 7 of the Endangered Species Act (16 U.S.C. 1531 et. seq.), Section 305(b) of the Magnuson-Stevens Act (16 U.S.C. 1855(b), the Fish and Wildlife Coordination Act (FWCA) and Executive Order No. 13089 pertaining to the protection of coral reefs. We offer the following comments on the draft EA.

NMFS appreciates the efforts made by the Navy to work with the contractors and the resource agencies (NMFS, U.S. Fish and Wildlife Service (FWS), and the State of Hawaii Department of Land and Natural Resources (DLNR)). This cooperative work initiated during the project scoping process has continued throughout the development of the EA.

Coral Reefs, Executive Order No. 13089.

Potential exists for damage to corals during the transit from the vessels current location to the shallow water recovery site as a result of diesel fuel or other petroleum products seeping from the vessel. The EA includes an adequate continency plan for control of inadvertent releases of oil. Incident accident plans have been developed to ensure timely and effective response actions and protection of the environment. The plan would include the use of Naval Sea System Command Emergency response equipment and local commercial response equipment.

Potential also exists for damage to corals from the placement of the *Ehime Maru* and the anchoring of support vessels at the shallow water recovery site. However, through the cooperative multi-agency working group, resource agency biologists from NMFS, FWS, and State DLNR have worked closely with the contractors and the Navy to identify an appropriate primary shallow water recovery site which will minimize damage to coral reefs and other marine resources

Essential Fish Habitat/FWCA
All three of the action areas are located within EFH designated under the following Fisheries Management Plans (FMP):

- Bottomfish and Seamount Groundfish (Amendment 6)
- Pelagic (Amendment 8)
- Crustaceans (Amendment 10)

The EA concludes that the proposed action will not adversely affect EFH designated under the various FMPs. Provided that measures outlined in the EA for the control of inadvertent releases of oil and the protection of bottom habitat are implemented, NMFS concurs that the potential for impacts to EFH are minimal and additional EFH conservation recommendations will not be necessary. A Department of the Army permit issued by the U.S. Army Corps of Engineers will be required for the placement of the vessel at the shallow water recovery site. Further comments may be provided during the permit review period.

Endangered Species Act
In response to your letter of May 29, 2001, requesting informal consultation under section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) and our review of the EA and related documents, NMFS concurs with your determination that listed species and/or critical habitat are not likely to be adversely affected by the proposed action. Specifically, the EA addresses several species under NMFS jurisdiction: green turtles (*Chelonia mydas*); hawksbill turtles (*Eretmochelys imbricata*); Hawaiian monk seals (*Monachus schauinslandi*); humpback whales (*Megaptera novaeangliae*); and sperm whales (*Physeter macrocephalus*). The EA concludes that, with the Best Management Practices and the implementation of activities as outlined in the Incident Action Plan in the unlikely event of an oil release,

these species and/or critical habitat are not likely to be adversely affected by the recovery and relocation activities. NMFS concurs with this determination and hereby concludes the section 7 consultation process for this action. The reference number for this consultation is I-PI-01-73: MMD. If project plans change or additional information become available, this determination may be reconsidered

Thank you for your consideration. Should you have any questions, please contact John Naughton at 973-2935, extension 211, Alan Everson at 973-2935, extension 212 or Margaret Akamine Dupree at 973-2935 extension 210.

Sincerely,

C. Karnella

Rebecca Lent, Ph.D.
Regional Administrator

Copies Furnished:

Ms. Leona Stevenson, Southwest Region, NMFS, 501 West Ocean Blvd.,Suite 4200, Long Beach, CA 90802-4213
Mr. James Slawson, Southwest Region, NMFS, 501 West Ocean Blvd., Suite 4200, Long Beach, CA 90802-4213
U.S. Environmental Protection Agency, P.O. Box 5003, Honolulu, Hawaii 96850
U.S. Fish and Wildlife Service, Environmental Services, P.O. Box 50088, Honolulu, HI 96850
Clean Water Branch, Environmental Management Division, Hawaii State Department of Health, P.O. Box 3378, Honolulu, HI 96801-3386
Hawaii State Department of Business, Economic Development and Tourism, Office of Planning, Coastal Zone Management Program, P.O. Box 2359, Honolulu, HI 96804
State of Hawaii, Department of Land and Natural Resources, Division of Aquatic Resources, P.O. Box 621, Honolulu, HI 96809
US Army Corps of Engineers, Regulatory Branch, Building 230, Fort Shafter, HI 96858

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APPENDIX C
ENVIRONMENTAL LAWS AND REGULATIONS CONSIDERED

APPENDIX C
ENVIRONMENTAL LAWS AND REGULATIONS CONSIDERED

The following Federal environmental laws and regulations were reviewed to assist in determining the significance of environmental impacts under the National Environmental Policy Act (NEPA).

GENERAL

NEPA (42 USC 4321 et seq.) is the basic U.S. charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy. NEPA is a procedural statute, requiring that federal agencies consider the environmental effects of their actions when making decisions. NEPA procedures must ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing the NEPA. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.

The Council on Environmental Quality Regulations (40 CFR 1500-1508) provide guidance for implementing the procedural provisions of the NEPA and are binding on federal agencies. Executive Order 11514, Protection and Enhancement of Environmental Quality (as amended by Executive Order 11991), Department of Defense (DOD) Instruction 4715.9, Environmental Planning and Analysis, and Naval Operations Instruction (OPNAVINST) 5090.1B, Environmental and Natural Resources Planning Manual, provide further direction to Federal agencies so they understand how to comply with the procedures and achieve the goals of the NEPA process.

WATER QUALITY

The objective of the Clean Water Act (33 USC 1251 et seq.) is to restore and maintain the chemical, physical, and biological integrity of the nation's waters.

The Clean Water Act prohibits any discharge of pollutants into any public waterway unless authorized by a permit (33 USC 1342, 1343). Under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit establishes precisely defined requirements for water pollution control.

Under the Clean Water Act, the U.S. Environmental Policy Act (EPA) is the principal permitting and enforcement agency for NPDES permits. This authority may be delegated to the states.

The Clean Water Act requires all branches of the Federal government involved in an activity that may result in a point-source discharge or runoff of pollution to U.S. waters to comply with applicable Federal, interstate, state, and local requirements.

The Rivers and Harbors Appropriation Act of 1899 (33 USC 403 et seq.) regulates the disposal of materials into the rivers and harbors of the United States. Section 10 of the Act prohibits the unauthorized obstruction or alteration of any navigable water of the U.S., and requires a permit from the Army Corps of Engineers for the construction of any structure or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters.

MARINE BIOLOGICAL RESOURCES

The Endangered Species Act (16 USC 1531 et seq.) declares that it is the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species. Further, the Act directs Federal agencies to use their authorities in furtherance of the purposes of the Act.

Under the Endangered Species Act, the Secretary of the Interior creates lists of endangered and threatened species. The term endangered species means any species which is in danger of extinction throughout all or a significant portion of its range. The Act defines a threatened species as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

A key provision of the Endangered Species Act for Federal activities is Section 7 consultation. Under Section 7 of the Act, every Federal agency must consult with the Secretary of the Interior, U.S. Fish and Wildlife Service (USFWS), to ensure that any agency action (authorization, funding, or execution) is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species.

Through the Fish and Wildlife Conservation Act (16 USC 2901 et seq.), Congress encourages all Federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats. Further, the Act encourages each state to develop a conservation plan.

The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires a Federal department or agency that proposes or authorizes the modification, control, or impoundment of the waters of any stream or body of water (greater than 10 acres [4.1 hectares]), including wetlands, to first consult with the USFWS. Any such project must make adequate provision for the conservation, maintenance, and management of wildlife resources. The Act requires a Federal agency to give full consideration to the recommendations of the USFWS and to any recommendations of a state agency on the wildlife aspects of a project.

The Migratory Bird Treaty Act (16 USC 703-712) protects many species of migratory birds. Specifically, the Act prohibits the pursuit, hunting, taking, capture, possession, or killing of such species or their nests and eggs. The Act further requires that any affected Federal agency or department must consult with the USFWS to evaluate ways to avoid or minimize adverse effects on migratory birds.

The Marine Mammal Protection Act (16 USC 1361 et seq.) establishes a moratorium on the taking and importation of marine mammals and marine mammal products. The Marine Mammal Commission, which was established under the Act, reviews laws and international conventions, studies world-wide populations, and makes recommendations to Federal officials concerning marine mammals.

The National Marine Sanctuaries Act (16 USC 1431 et seq.), which is Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, seeks to enhance both public awareness and conservation of the marine environment. The purposes and policies of the Act are to identify areas of national significance, to provide coordinated management of these marine areas, to support scientific research of these areas, to enhance public awareness of the marine environment, and to facilitate public use of marine resources when not in conflict with the other policies.

The Ocean Dumping Act (33 USC 1401 et seq.), which is Title I of the Marine Protection, Research, and Sanctuaries Act, governs the disposal of all materials into the ocean, including sewage sludge, industrial waste, and dredged materials. Amendments in 1980 also prohibited the ocean dumping of radiological, chemical, or biological warfare agents or high-level radioactive wastes. Further amendments in 1983 prohibited the issuance of permits authorizing the ocean dumping of any low-level radioactive wastes or radioactive waste materials, unless certain requirements were met.

HEALTH AND SAFETY

The purpose of the Occupational Safety and Health Act (29 USC 651 et seq.) is to assure, so far as possible, every working man and woman in the nation safe and healthful working conditions and to preserve human resources. Regulations implementing the Act are found at 29 CFR, Parts 1900-1990.

The Act further provides that each Federal agency has the responsibility to establish and maintain an effective and comprehensive occupational safety and health program that is consistent with national standards. Each agency must:

- Provide safe and healthful conditions and places of employment
- Acquire, maintain, and require use of safety equipment
- Keep records of occupational accidents and illnesses
- Report annually to the Secretary of Labor

Finally, Section 126 of the Superfund Amendments and Reauthorization Act of 1986 (SARA) (29 USC Section 655 note) requires the Occupational Safety and Health Administration to issue regulations specifically designed to protect workers engaged in hazardous waste operations. The hazardous waste rules include requirements for hazard communication, medical surveillance, health and safety programs, air monitoring, decontamination, and training.

HAZARDOUS MATERIALS AND HAZARDOUS WASTES

Under the Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.), Congress declares the national policy of the United States to be, whenever feasible, the reduction or elimination, as expeditiously as possible, of hazardous waste. Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment.

The RCRA defines waste as hazardous through four characteristics: ignitability, corrosivity, reactivity, or toxicity. Once defined as a hazardous waste, the RCRA established a comprehensive cradle-to-grave program to regulate hazardous waste from generation through proper disposal or destruction.

The RCRA also establishes a specific permit program for the treatment, storage, and disposal of hazardous waste. Both interim status and final status permit programs exist.

The RCRA defines solid waste as any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations and from community activities. To regulate solid waste, the RCRA provides for the development of state plans for waste disposal and resource recovery. The RCRA encourages and affords assistance for solid waste disposal methods that are environmentally sound, maximize the utilization of valuable resources, and encourage resource conservation. The RCRA also regulates mixed wastes. A mixed waste contains both a hazardous waste and radioactive component.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq.)-commonly known as Superfund-provides for funding, cleanup, enforcement authority, and emergency response procedures for releases of hazardous substances into the environment.

The CERCLA covers the cleanup of toxic releases at uncontrolled or abandoned hazardous waste sites. By comparison, the principal objective of the RCRA is to regulate active hazardous waste storage, treatment, and disposal sites to avoid new Superfund sites. The RCRA seeks to prevent hazardous releases; a release triggers the CERCLA.

The goal of the CERCLA-mandated program (Superfund) is to clean up sites where releases have occurred or may occur. A trust fund supported, in part, by a tax on petroleum and chemicals supports the Superfund. The Superfund allows the Government to take action now and seek reimbursement later.

The CERCLA also mandates spill-reporting requirements. The Act requires immediate reporting of a release of a hazardous substance (other than a Federally permitted release) if the release is greater than or equal to the reportable quantity for that substance.

Title III of the Superfund Amendments and Reauthorization Act (SARA) (42 USC 9601 et seq.) is a freestanding legislative program known as the Emergency Planning and Community Right to Know Act (EPCRA) (42 USC 11001 et seq.). The Act requires immediate notice for accidental releases of hazardous substances and extremely hazardous substances; provision of information to local emergency planning committees for the development of emergency plans; and availability of Material Safety Data Sheets, emergency and hazardous chemical inventory forms, and toxic release forms.

The EPCRA requires each state to designate a state emergency response commission. In turn, the state must designate emergency planning districts and local emergency planning commissions. The primary responsibility for emergency planning is at the local level.

The Pollution Prevention Act of 1990 (42 USC 13101 et seq.) established that pollution should be prevented at the source, recycled or treated in an environmentally safe manner, and disposed of or otherwise released only as a last resort. Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements," commits Federal agency planning, management, and acquisition to the Pollution Prevention Act of 1990. It also requires all Federal facilities to comply with the EPCRA, develop a written pollution prevention strategy emphasizing source reduction, and develop voluntary goals to reduce total releases and off-site transfers of Toxic Release Inventory toxic chemicals by 50 percent by 1999.

The Toxic Substances Control Act (TSCA) (15 USC 2601 et seq.) authorizes the administrator of the EPA broad authority to regulate chemical substances and mixtures which may present an unreasonable risk of injury to human health or the environment.

Under the TSCA the EPA may regulate a chemical when the administrator finds that there is a reasonable basis to conclude that the manufacture, processing, distribution in commerce, use, or disposal of a chemical substance or mixture poses or will pose an unreasonable risk of injury to health or the environment.

Under the TSCA the EPA administrator, upon a finding of unreasonable risk, has a number of regulatory options or controls. The EPA's authority includes total or partial bans on production, content restrictions, operational constraints, product warning statements, instructions, disposal limits, public notice requirements, and monitoring and testing obligations.

The TSCA Chemical Substance Inventory is a database providing support for assessing human health and environmental risks posed by chemical substances. As such, the inventory is not a list of toxic chemicals. Toxicity is not a criterion used in determining the eligibility of a chemical substance for inclusion on the inventory.

AIRSPACE

The Federal Aviation Act of 1958 gives the Federal Aviation Administration (FAA) sole responsibility for the safe and efficient management of all airspace within the continental United States, a responsibility that must be executed in a manner that meets the needs of all airspace users, both civil and military. The FAA's policy on airspace is implemented by FAA Order 1000.1A and is stated in FAA Handbook 7400.2C, Procedures for Handling Airspace Matters, as follows:

> The navigable airspace is a limited national resource, the use of which Congress has charged the FAA to administer in the public interest as necessary to insure the safety of aircraft and the efficient utilization of such airspace. Full consideration shall be given to the requirements of national defense and of commercial and general aviation and to the public right of freedom or transit through the airspace. Accordingly, while a sincere effort shall be made to negotiate equitable solutions to conflicts over its use for non-aviation purposes, preservation of the navigable airspace for aviation must receive primary emphasis. (FAA Order 7400.2C CHG 4 Section 1006, 1991)

The FAA regulates military operations in the National Airspace System through the implementation of FAA Handbook 7400.2 and FAA Handbook 7610.4G, Special Military Operations. The latter was jointly developed by the Department of Defense (DOD) and FAA to establish policy, criteria, and specific procedures for air traffic control planning, coordination, and services during defense activities and special military operations.

Part 7 of FAA Handbook 7400.2 contains the policy, procedures, and criteria for the assignment, review, modification, and revocation of special use airspace. Special use airspace, including prohibited areas, restricted areas, military operations areas, alert areas, and controlled firing areas, is airspace of defined dimensions wherein activities must be confined because of their nature, or wherein limitation may be imposed upon aircraft operations that are not a part of those activities, or both (FAA Order 7400.2C CHG 4, 1991).

DOD policy on the management of special use airspace is essentially an extension of FAA policy, with additional provisions for planning, coordinating, managing, and controlling those areas set aside for military use. Airspace policy issues or interservice problems that must be addressed at the DOD level are handled by the DOD Policy Board on Federal Aviation, a committee composed of senior representatives from each service. However, airspace action within the DOD is decentralized, with each service having its own central office to set policy and oversee airspace matters.

Executive Order 10854 extends the responsibility of the FAA to the overlying airspace of those areas of land or water outside the jurisdiction of the United States. Under this order, airspace actions must be consistent with the requirements of national defense, must not be in conflict with any international treaties or agreements made by the United States, nor be inconsistent with the successful conduct of the foreign relations of the United States. Accordingly, actions concerning airspace beyond U.S. jurisdiction (12 miles [19 kilometers]) require coordination with the DOD and State Department, both of which have preemptive authority over the FAA (FAA Order 7400.2C, CHG 4, Section 1009, 1991).

Part 7 of FAA Handbook 7400.2 contains the policy, procedures, and criteria for the assignment, review, modification, and revocation of special use airspace overlying water, namely, warning areas. A warning area is airspace of defined dimensions over international waters that contains activity which may be hazardous to nonparticipating aircraft. Because international agreements do not provide for prohibition of flight in international airspace, no restriction of flight is imposed. The term "warning area" is synonymous with the International Civil Aviation Organization term "danger area" (FAA Order 7400.2C CHG 4, Section 7400, 1991).

Navy OPNAV Instruction 3770.2H, Airspace Procedures Manual (1994), prescribes the Navy's airspace management procedures and delineates responsibilities for airspace planning and administration.

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APPENDIX D
LOCATION ASSESSMENT

LOCATION ASSESSMENT

Study of Candidate Shallow-water Recovery Sites to Support Diving Operations for *Ehime Maru*

April 27, 2001

Prepared by: EDAW, Inc.
Prepared for: U.S. Army Space and Missile Defense Command
Huntsville, Alabama

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Purpose

This Location Assessment was conducted to quickly evaluate the site characteristics of five candidate shallow-water recovery sites, or berthing sites, selected by the Navy to perform recovery operations on *Ehime Maru*. This study supports the environmental assessment (EA) for the recovery operations and resulted in a recommendation as to which of the candidate shallow-water work sites should be advanced as the "preferred action" and "alternative sites" for inclusion in the EA.

The EA was prepared under an extremely compressed schedule in order to achieve the most favorable weather period (and sea state) for performing the recovery operation (July–October). Since time was of the essence and a suitable number of alternative sites had been identified by the Navy, it was deemed unnecessary to identify additional candidate sites. Instead, the location assessment concentrated solely on evaluating the comparative attributes of the Navy-picked candidate shallow-water recovery sites in order to support a ranking and decision.

Background

When the decision was made to attempt the recovery of *Ehime Maru*, Naval Sea Systems Command (NAVSEA) Supervisor of Salvage (SUPSALV), Mobile Diving and Salvage Unit One (MDSU-ONE), and Pacific Fleet (PACFLT) maintenance personnel developed a preliminary slate of sites that could potentially serve as shallow-water work sites for the recovery operations. The locations were selected based on their extensive knowledge of Hawaiian coastal waters and their understanding of the engineering requirements for the recovery operation. The early mission critical requirements of the shallow-water recovery sites included:

- An expanse of relatively flat seafloor at about 115 feet of sea water (FSW) (35 meters) (sufficient depth of water to clear the vessel, spreader beam, support barge and associated rigging)
- Favorable sea state (to minimize diver safety issues)
- A relocation transit corridor with minimal seafloor relief (to minimize the potential for seafloor collision while towing and to minimize adjustments to the lift rigging)
- Reasonable proximity to Navy support and emergency services

Based on professional judgment, the Navy identified five candidate shallow-water recovery sites as potentially suitable to achieve the recovery operations (figure D-1):

- Reef Runway—On the southern coast of Oahu at approximately the mid-point of the Reef Runway, Honolulu International Airport (21° 17.6' N/ 157° 55.8' W) (figure D-2)
- Ewa Beach—a site approximately 3.3 nautical miles (nm) (6 kilometers [km]) west–southwest from the mouth of Pearl Harbor, Oahu (21° 17.5' N/ 158° 00.8' W) (figure D-3)
- Waianae Coast—a site approximately 1 nm (91.8 km) northwest of Barber's Point Harbor, Oahu (21° 19.8' N/ 158° 08.3' W) (figure D-4)
- Penguin Bank—a shoal approximately 28 nm (51 km) southwest of Pearl Harbor, situated in the open channel west of Molokai (20° 53.5' N/ 157° 45.0' W) (figure D-5)
- SW Molokai—approximately 1.9 nm (3.5 km) east–southeast of Laau Pt., in the lee of Molokai (21° 05.0' N/ 157° 17.0' W) (figure D-6)

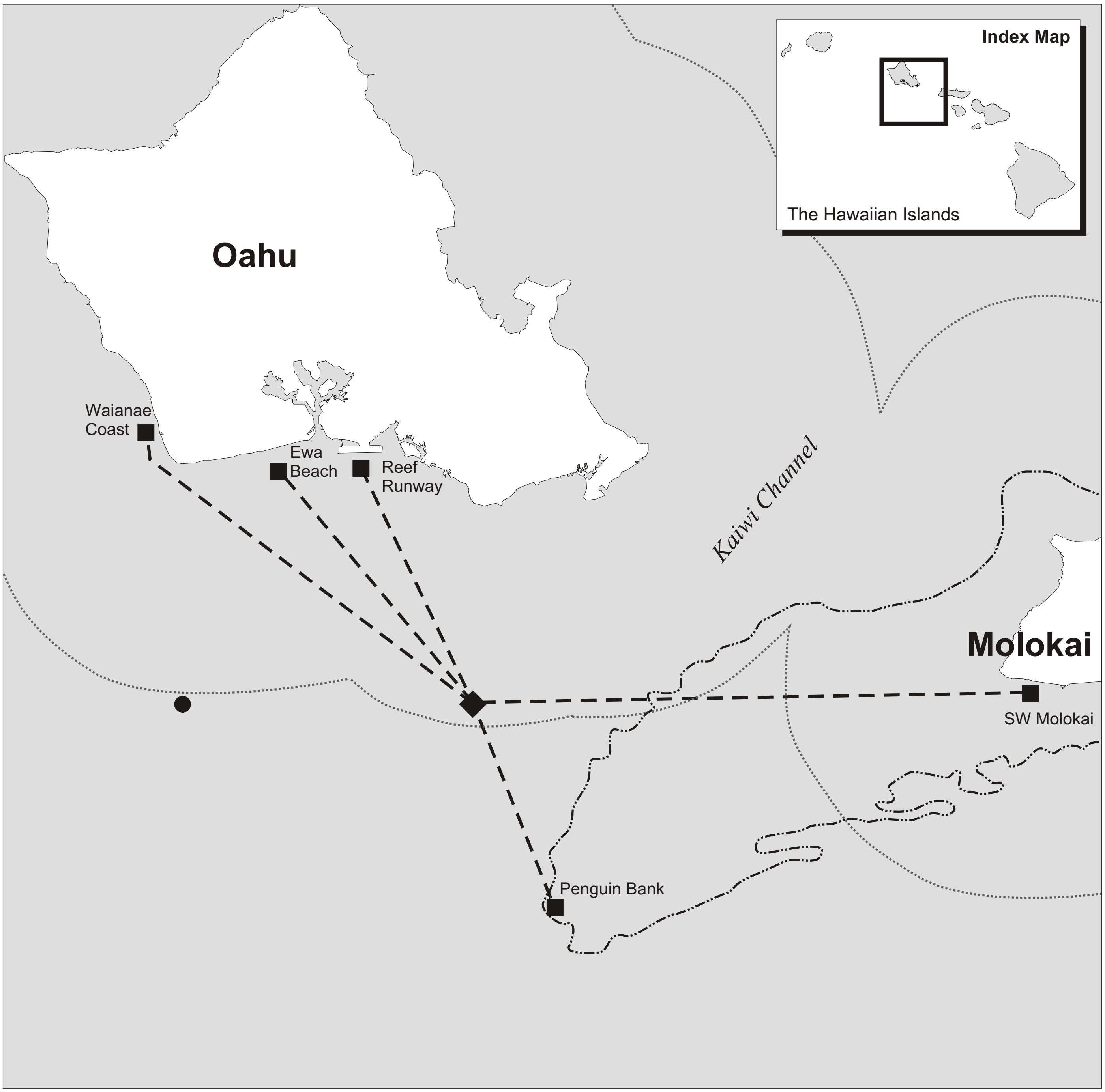
Referenced figures D-2 through D-6 are attached at the end of this report.

Findings

Based on the scoring methodology described later in this report, Reef Runway was clearly rated as the preferred site. The Reef Runway Site rated a weight-adjusted score of 3.88 (out of a possible 5.00). Reef Runway scored well based on the attributes of its transit corridor (direct with favorable seafloor profile); its historically disturbed environmental setting; proximity to Pearl Harbor (where the Navy can provide more responsive security, technical, and emergency services); and its position relative to tower controlled airspace of Honolulu International Airport, which ensures a high degree of enforcement of low-flying aircraft.

The next highest ranked alternatives were scored 2.96 and 2.86 for Ewa Beach and Waianae Coast, respectively. It is recommended that Ewa Beach and Waianae Coast be retained for further analysis. Ewa Beach shares many of the logistical attributes of Reef Runway in being close to Pearl Harbor; however, it rates slightly lower due to increased seafloor relief along the transit route, slightly rougher sea states, observed listed species, and close proximity to aquaculture farming. Attributes of Waianae Coast include the best seafloor conditions for stabilizing the vessel hull, enforceable airspace, and acceptable sea states for transit and recovery operations.

It is recommended that Southwest Molokai and Penguin Bank be dropped from further consideration. On the five-point scale, Southwest Molokai and Penguin Bank scored 2.27 and 2.25, respectively. Both Penguin Bank and Southwest Molokai are within the Hawaiian Islands National Humpback Whale Marine Sanctuary. In addition, the Penguin Bank seafloor is below the preferred depth for the recovery operation; plus, it is situated in



LEGEND

- Current Location
- Candidate Shallow-water Recovery Sites
- Deep-water Relocation Site
- Penguin Bank
- U.S. Territorial Waters
- Potential Transit Routes

NORTH

No Scale

Candidate Shallow-water Recovery Sites

Figure D-1

D1PotentialRecovery051601

the open channel, an area of extremely volatile sea state. Southwest Molokai was also considered unsuitable due to the dangerously shallow transit route the vessel would have to take across Penguin Bank, its relatively pristine environmental setting, and the difficulty of providing support and emergency services for a moderately long-term operation.

Study Approach

The study was conducted using a systematic approach:

- Program goals were developed in discussion with NAVSEA SUPSALV and PACFLT Maintenance management.
- Program goals were translated into workable objectives and technical criteria.
- Metrics were developed to support the criteria that were consistent and relevant to the evaluation.
- Interviews were conducted with knowledgeable civilian, military, contractor and agency personnel, and data was collected to support the criteria requirements.
- Criteria were applied in a systematic way in order to evaluate the relative opportunities and constraints of each candidate site.
- Weights and scores were developed to reflect the value of each criterion relative to the overall set.
- Sensitivity analyses were performed to evaluate the relative biases and effects of various weighting factors.
- Rank ordering of the shallow-water recovery sites was performed to support a recommendation for inclusion into the EA for further study.

Concurrent with, and closely following this study, field surveys were performed consisting of spot dives, controlled subsurface video transects, and detailed fathometric soundings done on three of the locations (Reef Runway, Ewa Beach, and Waianae Coast). Only individual dive reports (spot observations) were available at the time of this study.

Study Assumptions

Study Elements

The recovery operation is very complicated and encompasses many work stages described in detail in the EA Description of Proposed Action and Alternatives. This study addresses two aspects of the recovery:

1. The evaluation and selection of a shallow-water recovery site

2. The evaluation of transit routes from the current deep water position (accident site) to the shallow-water recovery sites (berth sites)

The deep-water relocation site was not a focus of this study because there were few, if any, discriminating factors that would support the distinction among alternative sites at this stage.

Study Area

Each shallow-water recovery site was initially defined as a 1,000-foot by 1,000-foot (300-meter by 300-meter) plot. The center point of the plot was the latitude/longitude coordinates provided by the Navy (listed above). The plot reflects a rough estimate of the size of the diving barge, plus the estimated spread of the mooring lines. There was some margin provided to allow for flexibility in adjusting the footprint of the vessel (191 feet by 30.5 feet [57.9 meters by 9.2 meters]) within the plot. A detailed mooring plan is provided in section 2.0 of the EA. At the time of the final report, the mooring footprint had grown to roughly twice the original dimensions.

Weather

The study was predicated on average meteorological conditions for the period July through October provided by the Navy's Meteorology and Oceanography Center in Pearl Harbor. Many factors in this study are tied to the "sea state," a seaman's term for the combination of swell and wind. During the summer months, Hawaiian weather is dominated by moderate trade wind flows. Trade wind flows occur 90% of the time producing average winds from the east-northeast at 10 to 15 knots (20 to 30 kilometers per hour) during July, August, and September and increase to 10 to 20 knots (20 to 40 kilometers per hour) during October. Average seas during this period are to the west–southwest at 3 to 6 feet (1 to 2 meters) during July, August, and September, and 4 to 7 feet (1.2 to 2.1 meters) during October. There was no information available on average sea states (categories) for this period; however, wind speeds and wave heights of this nature are correlative with sea states of 2 to 4. Local mariners familiar with weather conditions at each of the candidate shallow-water recovery sites provided a "seaman's eye" for input to the sea states at each of these sites.

Kona winds frequently occur during the winter, in the months of November through February. These winds are primarily from the south and have associated waves from the southeast and west with heights of 10 to 15 feet (3 to 5 meters). The implication of this change is that prevailing sea states can change dramatically, and accidental oil spills, which would normally flow offshore, could flow onshore and become problematic. The initial vessel lift and relocation to the shallow-water recovery site will be done only when there is a forecasted period of stable weather. The recovery operations would be subject to typical and atypical weather conditions.

Seafloor Conditions

Although the gross physical attributes of each site can be characterized by analyzing maps, literature, and interview data, detailed follow-on surveys must be performed in order to validate bottom sediments and profile, environmental conditions, and presence of critical seafloor structures, such as buried cables, fueling lines, sewers, etc. Seafloor profiling was scheduled along the transit routes to identify obstacles to vessel towing.

Evaluative Criteria

Development of Goals for the Location Assessment

Based on stated goals of NAVSEA and PACFLT management, the following goals and objectives were established for this study:

- Maximize dive team safety
  - Minimize operating risks to divers at shallow-water recovery sites
  - Maximize the probability of stabilizing the vessel
  - Minimize disruption to diver communications
  - Maximize emergency response capabilities

- Maximize probability for successful lift and relocation operations
  - Minimize transit risk
  - Maximize technical support to the recovery operations

- Maximize public health and safety
  - Minimize intrusions from inquiring public during recovery operations
  - Minimize the potential for public exposure to accidental releases

- Minimize environmental impacts
  - Minimize the potential for environmental effects due to accidental spills

Evaluative Criteria Application and Analysis

The following section describes the criteria and measures supporting each of the program goals and objectives mentioned above. Following each criterion, a short analysis is provided which describes the appropriate score.

Goal 1—Maximize Dive Team Safety

Objective: Minimize Operating Risks to Divers at Shallow-Water Recovery Site

Criterion: Prefer shallow-water recovery sites where prevailing wind and sea state is favorable to diving operations.

> ***Rationale***: Wave height and wind can complicate barge and diving operations, resulting in a higher accident incident rate.
>
> ***Metric***: Sea state charts from U.S. Navy Dive Manual, SS521-AG—PRO-010; January 1999.
>
> ***Range***: Candidate sites were scored from 5 (high) to 1 (low) based on the following prevailing conditions as assessed by a seaman's eye:
>
> > ***Score 5***—Sea state "0" (ripples with scales, but without foam crests); light air < 2 knots.

Score 4—Sea state "1" (small wavelets still short but more pronounced; crests have a glassy appearance but do not break); light breeze < 5 knots.

Score 3—Sea state "2" (large wavelets, crests begin to break; foam of glassy appearance, perhaps scattered whitecaps); gentle breeze <10 knots.

Score 2—Sea state "3" (small waves, becoming longer; fairly frequent whitecaps), moderate breeze 11 to 16 knots.

Score 1—Sea states "4" and greater (larger than moderate waves taking a more pronounced long form; many white caps are formed; chance of spray); fresh breeze to hurricane > 16 knots.

Analysis: Since site specific data were not available for each individual site, the following sea states were assessed based on the "seaman's eye" approach:

Reef Runway—Generally sea states 3, and on windy days, sea state 4; **Score 2**

Ewa Beach—Generally sea states 3 to 4; **Score 2**

Waianae Coast—Leeward coast of Barber's Point provides wind shadow; generally sea state 2; **Score 3**

Penguin Bank—Exposed to open channel; sea state 4 plus; **Score 1**

SW Molokai—Leeward coast of Molokai; generally sea states 2-3; **Score 3**

Objective: Maximize the Probability of Stabilizing the Vessel at the Shallow-Water Recovery Site

Criterion: Prefer shallow-water recovery sites with flat bottoms with sandy substrate of sufficient thickness to promote vessel embedment.

Rationale: Flat, sandy bottom conditions are preferred for stabilizing the vessel during recovery operations. A hard surface, uneven surface (local relief) or tilting surface gradient, may trigger the need for secondary support systems including sand bags, cradles or anchoring systems to ensure vessel stability. Mud bottoms are least preferred due to the amount of force necessary to overcome the mud suction following recovery operations.

Metric: Average seafloor gradients in percent (down slope from 72 FSW to 100 FSW) [22 to 30 meters]; local relief (surface features/perturbations, e.g., coral heads) in feet/ meters; and bottom sediment types (rock/coral, sand, or mud) as observed from preliminary dive observations.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

> ***Score 5***—Seafloor gradients < 3%; minimal local relief (< 1 ft) [0.3m]; and sand blanket of greater than 2 feet [0.6m].
>
> ***Score 4***—
>
> ***Score 3***—Seafloor gradients > 3 < 6%; moderate local relief (>1 < 3 feet) [> 0.3m < 1 meter]; sand blanket/veneer and/or rubble over exposed coral or rock.
>
> ***Score 2***—
>
> ***Score 1***—Seafloor gradients > 6%; significant relief (> 3 feet) [1 meter]; mud bottom.

Note: Intermediate scores (Scores 2 and 4) can be achieved by combinations of category attributes.

Analysis: Assessment made from initial dive reports and interpolation of bathymetric maps.

> **Reef Runway**—Seaward gradient is approximately 4 to 5%; an ancient shoreline escarpment bisects the site at approximately 70 to 85 feet (21 to 25.7 meters); gradients appear to get slightly steeper below the escarpment but bottom conditions get sandier; local relief generally ranges from 0 to 2 feet (0 to 0.6 meters); much of the site is covered with patches of sand (less than 6 inches) mixed with coral rubble over rock; **Score 3**
>
> **Ewa Beach**—Seaward gradient appears to range from approximately 4.6 to 8.4%; local relief is generally less than 1 foot (0.3 meters); hard sand with shells and silt; **Score 2**
>
> **Waianae Coast**—Seaward gradient is relatively flat at 1.3 to 2.0%; local relief appears to be generally less than 1 foot (0.3 meters), however, local coral in-shore increase relief at 2 to 3 feet (0.6-1 meters) in height. Extensive sand cover; **Score 4**
>
> **Penguin Bank**—Seafloor gradient roughly flat; local relief is predicted to be significant, with coral heads and general hard coral surface; **Score 1**
>
> **SW Molokai**—Seaward gradient appears mild at < 3%; local relief is unknown as are bottom sediments; **Score 3** (preliminary)

Criterion: Prefer shallow-water recovery sites where bottom currents are minimal.

Rationale: Bottom currents can increase the risk of diving operations by potentially destabilizing the vessel while at berth. In addition, stiff bottom currents force the diver to wear additional weights, forcing the diver to exert more energy and decreasing their ability to "off gas" nitrogen in the blood stream.

Metric: Bottom current velocities in knots from MK 21 Mod 1 General Characteristics; U.S. Navy Dive Manual, SS521-AG—PRO-010; January 1999

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5— < 1.0 knots

Score 4-

Score 3— > 1.0 < 1.5 knots

Score 2-

Score 1— > 1.5 knots

Analysis: Bottom currents are a significant factor, but not a discriminator based on scant site-specific data at this juncture.

Reef Runway—Navy dive reports of 0.5 to 1.0 knots; **Score 5**

Ewa Beach—Estimated currents (seaman's eye) of 0.5 to 1.0 knots; **Score 5**

Waianae Coast—Estimated currents (seaman's eye) of 0.5 to 1.0 knots; **Score 5**

Penguin Bank—Unmeasured. Estimated to be greater than nearshore counterparts; **Score 3**

SW Molokai—Estimated bottom currents of 0.5 to 1.0 knots; **Score 5**

Objective: Minimize Disruption to Diver Communications

Criterion: Prefer shallow-water recovery sites where airspace can be controlled from ground surface to a minimum of 2,000 feet (610 meters).

Rationale: Divers use a "coms box" to communicate with the support barge during recovery operations. Positive communication is essential to a safe operation of this magnitude and complexity. Low flying aircraft, in particular helicopters, generate significant levels of noise that have been proven to degrade diver communication under similar circumstances, thus significantly increasing the risk of an accident. Although temporary flight restrictions can be established “to prevent unsafe congestion of sightseeing aircraft above an incident or event” (14 FAR Part 91.137(a)(3), it is often difficult for the Federal Aviation Administration (FAA) to enforce the restrictions in remote areas.

Metrics: Controlled airspace down to surface. Reference, meeting with FAA/DOT on April 20, 2001.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—Pre-existing Class B (tower controlled) airspace—high enforcement potential

Score 4—Class D airspace—tower communication can be established

Score 3/2—Class C airspace; can establish temporary flight restrictions with high confidence of FAA enforcement

Score 1—Class G airspace; uncontrolled

Analysis: Based on established FAA airspace maps.

Reef Runway—Class B; within tower controlled airspace of Honolulu International Airport; **Score 5**

Ewa Beach—Class D airspace; **Score 4**

Waianae Coast—Class D airspace; **Score 4**

Penguin Bank—Class G airspace; **Score 1**

SW Molokai—Class G airspace; **Score 1**

Objective: Maximize Emergency Response Capability at Recovery Site

Criterion: <u>Prefer shallow-water recovery sites that are in close proximity to emergency services.</u>

Rationale: The diving barge has limited medical support capabilities. In the event of a life-threatening accident, the amount of time required to transfer a diver or barge worker to a hospital could be critical. Depending on the recovery site location, such transfer could be made by boat (direct from the barge to shore) or by medevac helicopter (round-trip). The Fleet Recompression Chamber (FTRC) is at MDSU-ONE facilities, Pearl Harbor.

Metric: Elapsed time to reach the FTRC. Critical decompression injuries can occur after 30 minutes.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—Respond in < 15 minutes

Score 4-

Score 3— > 15 < 30 minutes

Score 2-

Score 1— > 30 minutes

Analysis:

Reef Runway—Boat can make FTRC at Pearl Harbor in < 15 minutes; **Score 5**

Ewa Beach—Boat can make FTRC at Pearl Harbor in < 15 minutes; **Score 5**

Waianae Coast—Will require transfer to shore and helicopter medevac, but can be achieved in less than 30 minutes; **Score 3**

Penguin Bank—Will require transfer to shore and round trip pick-up by medevac helicopter (> 30 minutes); **Score 1**

SW Molokai—Will require transfer to shore and round trip pick-up by medevac helicopter (> 30 minutes); **Score 1**

Goal 2—Maximize Probability of Successful Lift and Relocation Operations

Objective: Minimize Transit Risk to Shallow-Water Recovery Site

Criterion: Prefer shortest/most direct transit route to recovery site.

Rationale: Transit distance and course changes will increase the time in transit. The relocation operation will take place in a forecasted window of favorable weather. The longer the relocation period, the greater the probability of encountering negative changes in sea state.

Metric: Distance (nm) to candidate recovery sites.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—<15 nm (27.3 km)

Score 4—15 to 17.9 nm (27.3 to 32.5 km)

Score 3—18 to 21.9 nm (32.5 to 39.8 km)

Score 2—22 to 25.9 nm (39.8 to 47.1 km)

Score 1— > 26 nm (47.1 km)

Analysis:

Reef Runway—14 nm (25.5 km) from current vessel location to recovery site. **Score 5**

Ewa Beach—17 nm (31 km); **Score 4**

Waianae Coast—23 nm (42 km); **Score 2**

Penguin Bank—12.3 nm (22.4 km); **Score 5**

SW Molokai—31 nm (56.4 km); **Score 1**

Criterion: Prefer Transit Routes where prevailing wind and sea state is favorable to successful relocation to recovery site.

Rationale: During transit, prevailing wind and sea conditions will have a significant influence on the rolling of the tow vessel and the dynamic loading of the rigging.

Metric: Sea state charts from U.S. Navy Dive Manual, SS521-AG—PRO-010; January 1999.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—Transit route encounters following seas.

Score 4—

Score 3—Transit route encounters head seas.

Score 2—

Score 1—Transit route encounters beam seas.

Note: Intermediate scores (Scores 2 and 4) can be achieved by combinations of category attributes.

Analysis:

Reef Runway—Transit route is a beam sea; **Score 1**

Ewa Beach—Transit route is a beam sea; **Score 1**

Waianae Coast—Transit route is a following sea; **Score 5**

Penguin Bank—Transit route is a head sea; **Score 3**

SW Molokai—Transit route is a head sea; **Score 3**

Criterion: Prefer transit routes with uniform ascending seafloor gradients (i.e., minimal local relief) to recovery site.

Rationale: Towing the vessel near the seafloor (15 to 100 feet) [5 to 30 meters] provides for more favorable (stable) currents relative to the upper end of the water column. The marginal seafloor clearance also enhances the ability to set the vessel down, and later recover it, in the event of an equipment failure. The uniformity of the seafloor (lack of rapid changes in seafloor relief) improves the ability to control the tow clearance, minimizing the risk of collision. Uniform seafloor gradients minimize the use of winches in adjusting for significant changes in relief, further reducing the risk of single-point equipment failure.

Metric: Seafloor profile along projected direct transit routes to each recovery site (National Oceanic and Atmospheric Administration, 2001b). Assumes some flexibility in routing adjustments to avoid major seafloor discontinuities (reference figures D-7 and D-8 at the end of this appendix).

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—Uniform and relatively gradual regional (monoclinal) gradient/little local relief

Score 4-

Score 3—Abrupt/steep regional gradient; significant changes in local seafloor relief

Score 2-

Score 1—Abrupt/steep regional gradient; major seafloor discontinuities

Note: Intermediate scores (Scores 2 and 4) can be achieved by combinations of category attributes.

Analysis: Based on preliminary profiles developed from small-scale bathymetric maps.

Reef Runway—Relatively consistent regional gradient ascending rapidly toward the shallow-water recovery location. No significant local relief discernable at coarse map scales; detailed route surveys pending; **Score 5**

Ewa Beach—Favorable regional gradient with several minor negative corrections of 33 to 49 feet (10 to 15 meters); **Score 3**

Waianae Coast—Regional gradient has several significant negative corrections of approximately 120 to 197 feet (40 and 60 meters); **Score 2**

Penguin Bank—Radically steep initial ascent to Penguin Bank; **Score 2**

SW Molokai—Steep initial ascent (approximately 1,500 feet [455 meters] over a couple of nm). Approximately 70% of the route transects Penguin Bank at shallow depths of 24 to 27 fathoms (144 to 162 feet [44 to 49 meters]). High collision potential, plus shallow margins between vessel and critical coral habitat; **Score 1**

Objective: Maximize Technical Support to the Recovery Operation

Criterion: Prefer shallow-water recovery sites in close proximity to Navy Emergency Ship Salvage Material (ESSM) and MDSU-ONE support services

Rationale: Lessens response time (improves efficiency) for unanticipated load-out and support needs.

Metric: Boat response times from Navy ESSM and MDSU-ONE facilities, Pearl Harbor, to dive barge operations.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5— < 15 minutes

Score 4— > 15 < 30 minutes

Score 3— > 30 minutes < 1 hour

Score 2— > 1 hour < 2 hours

Score 1— > 2 hours

Analysis: Estimated response times based on distance.

Reef Runway—3.5 nm (6.4 km) from ESSM (less than 15 minutes); **Score 5**

Ewa Beach—5.3 nm (9.6 km) from ESSM (between 15 and 30 minutes); **Score 4**

Waianae Coast—15 nm (27.3 km) from ESSM (between 30 minutes and 1 hour); **Score 3**

Penguin Bank—30 nm (54.6 km) from ESSM (between 1-2 hours); **Score 2**

SW Molokai—43 nm (78.2 km) from ESSM (> 2 hours); **Score 1**

Goal 3—Maximize Public Health and Safety

Objective: Minimize Intrusions from Inquiring Public During Recovery Operations

Criterion: Prefer shallow-water recovery sites where a 1-mile (1.6-kilometer) surface security buffer can be enforced by Navy safety craft

Rationale: The diving operation is likely to generate intense interest and curiosity from the public. The fact that the recovery operations will be close to shore and visually observable will encourage small boats to intrude upon the operation. The ability to establish and control a 1 nm (1.9-km) stand-off perimeter around the recovery operations will be essential to protect the safety of both the general public and divers.

Metric: Type of support required from MDSU-ONE. Of particular note, Navy craft that would be sent to support shallow-recovery sites on southern Oahu are of smaller size and faster, than support vessels that would be used to navigate the open channel. The larger ships would be obtained from another command and would require considerable logistical support.

Range: Candidate sites were scored 5 (high) or 1 (low) based on the following performance guidelines:

Score 5—Line of site monitoring from Pearl Harbor tower of Naval Defense Sea Area; small patrol craft dispensed on-demand.

Score 1—Continuous patrols by large craft required 24/7

Analysis:

Reef Runway—Site can be monitored from the Pearl Harbor tower in the Naval Defense Sea Area. Small patrol craft can be dispatched on demand; **Score 5**

Ewa Beach—Must be secured by large patrol craft, 24/7; **Score 1**

Waianae Coast—Must be secured by large patrol craft, 24/7; **Score 1**

Penguin Bank—Must be secured by large patrol craft, 24/7; **Score 1**

SW Molokai—Must be secured by large patrol craft, 24/7; **Score 1**

Objective—Minimize the Potential for Public Exposure to Accidental Releases

Criterion: Prefer shallow-water recovery sites that are not near public and high-use recreational beaches

Rationale: Beaches are one of Hawaii's most important assets enjoyed daily by large numbers of the public. An accidental spill at a recovery site could potentially deposit oily waste on a public beach, or create an oil slick directly offshore that would inhibit recreational activity. There is also a nuisance factor that could include secondary concerns related to odors, or the closure of the beach during clean-up.

Metric: Distance (nm) to public beaches; prevailing winds and currents

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

> ***Score 5***—Prevailing winds/currents are off-shore; nearest recreational beach > 3 nm (5.5 km)
>
> ***Score 4***—
>
> ***Score 3***—Prevailing winds/currents project near-shore; nearest recreational beach > 1nm < 3 nm (1.8–5.5 km)
>
> ***Score 2***—
>
> ***Score 1***—Prevailing winds/currents project toward shore. Site is adjacent to a high use public beach

Note: Intermediate scores (Scores 2 and 4) can be achieved by combinations of category attributes.

Analysis:

> **Reef Runway**—Ewa Beach is approximately 3.8 nm (7 km) to the west; Sand Island State Park is about 2.6 nm (4.75 km) to the east; recreational boating at Kalihi Channel, 1.75 nm (3.2 km) to the east. Inside the Naval Defense Sea Area, civilian boats are not allowed; prevailing winds are favorable; **Score 5**
>
> **Ewa Beach**—Ewa Beach Park, about 1.6 nm (3 km) to the northeast, is a typical public beach park with some offshore fishing and diving. Oneula Beach Park is about 1.1 nm (2 km) due north; prevailing winds are favorable; **Score 3**
>
> **Waianae Coast**—The Waianae Coast area has a lot of coastal nearshore activity. Ko Olina Beach Park is 0.8 nm (1.6 km) southeast; Makiawa Beach Park is 1.1 nm (2 km) feet north—northeast; Kahe Point Beach Park is 1.4 nm (2.5 km) north (snorkeling area); Barber's Point Harbor is 1 nm (1.8 km) southeast; Nanakuli Beach is 2.6 nm (4.6 km) due north. Prevailing winds off-shore; **Score 2**
>
> **Penguin Bank—No local beaches; Score 5**
>
> **SW Molokai**—Holeono Point is 1.8 nm (3.3 km) to the east (harbor and airport); Laau Point is 1.9 nm (3.5 km) to the northwest. Not a high use beach but has beach activities including surfing and fishing; **Score 4**

Criterion: Prefer shallow-water recovery sites in close proximity to emergency spill response teams

Rationale: The ability to control accidental spill releases is primarily a function of response time.

Metrics: Distance (nm) to ESSM and/or private remediation cooperatives.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5— < 10 nm (18.2 km)

Score 4— > 10 < 20 nm (18.2 to 36.4 km)

Score 3— > 20 < 30 nm (36.4 to 54.5 km)

Score 2— > 30 < 40 nm (54.5 to 72.7 km)

Score 1— > 40 nm (72.7 km)

Analysis:

Reef Runway—3.5 nm (6.4 km) to ESSM; **Score 5**

Ewa Beach—5.3 nm (9.6 km) to ESSM; **Score 5**

Waianae Coast—15 nm (27.3 km) to ESSM; **Score 4**

Penguin Bank—30 nm (54.5 km) to ESSM; **Score 2**

SW Molokai—43 nm to ESSM; **Score 1**

Criterion: Prefer shallow-water recovery sites that are not near aquaculture farms or highly used commercial/recreational fishing areas.

Rationale: Reduce the risk of impeding access to commercial or highly used recreational fishing areas. Reduce the potential for impacting such areas in the event of accidental release.

Metric: Distance (nm) to known aquaculture/nearshore fishing areas. Prevailing wind directions are factored in.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—Nearest commercial/high-use fishing area > 3nm (5.5 km)

Score 4—

Score 3—Nearest commercial/high-use fishing area > 1 nm < 3nm (1.8 to 5.5 km)

Score 2-

Score 1—Site is < 1 nm (1.8 km) to a commercial/high-use fishing area

Note: Intermediate scores (Scores 2 and 4) can be achieved by combinations of category attributes.

Analysis:

Reef Runway—Existing aquaculture farm 0.75 nm (1.4 km) northeast on the inside of the reef along the east and south edge of the runway (0.5 fathoms); aquaculture site 1.85 nm (3.4 km) east of the site at the mouth of Kahili Channel; some activity south of Reef Runway in the nearshore waters including sport diving, shell collecting trolling and bottom fishing (Marine Atlas of the Hawaiian Islands). Gill netting off the east end of Reef Runway. Prevailing winds are favorable; **Score 4**

Ewa Beach—Leased aquaculture site is 0.8 nm (1.5 km) southeast of the site; existing scientific aquaculture site at unknown distance to the east (Telecon with NMFS/ State Dept of Fisheries); fish haven is 0.65 nm (1.2 km) southwest of site. Shore fishing at Ewa Beach which includes poll and line fishing, crabbing, gill netting, lobster fishing, and bottom fishing in off-shore (plus 30 feet [9 meters]); **Score 2**

Waianae Coast—North of harbor is shore fishing; bottom fishing at the harbor mouth and off beaches; spear fishing, commercial lobster (greater depths and rock substrates). Less than 1 nm (1.8 km) to the harbor mouth. Prevailing winds favorable; **Score 2**

Penguin Bank—Some diving. No known aquaculture farms; **Score 5**

SW Molokai—Trolling and bottom fishing in area; throw netting and pole/line fishing from the shore. Not heavily fished; **Score 5**

Goal 4—Minimize Environmental Impacts

Objective: Minimize the Potential for Environmental Affect Due to Accidental Spills

Criterion: Prefer shallow-water recovery sites that are not near to marine sanctuaries/refuges, coral reefs, listed species and critical habitat.

Rationale: Hawaiian coastal waters constitute a delicate ecosystem for numerous marine and terrestrial species of flora and fauna. Many species and habitats are protected by law. It is preferred that shallow-water berths fall outside of Federal/State managed waters.

Metrics: Known State and Federal environmentally managed lands, waters, species, and habitats as identified above.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—No listed species or critical habitat in the near vicinity.

Score 4—

Score 3—No listed species or critical habitat in the recovery site footprint.

Score 2—

Score 1—Site is in existing sanctuary/refuge/reserve; listed species/ habitat prevalent.

Analysis:

Reef Runway—not in a sanctuary or reserve; no listed species observed; small patches of sea grass inside northeast corner; productive coral only in shallow water. No sea turtles observed; **Score 4**

Ewa Beach—green sea turtles prevalent; productive coral in shallower depths and patches of sea grass; **Score 2**

Waianae Coast—listed species; green sea turtles (however, probably do not feed off sandy bottom) and whales off-shore. Not a sanctuary or refuge; **Score 2**

Penguin Bank—Located in the Humpback whale sanctuary; healthy coral beds; other mammals under the Marine Mammal Protection Act; **Score 1**

SW Molokai—Located in the Humpback whale sanctuary; green sea turtles habitat, variety of shore birds; other mammals under the Marine Mammal Protection Act; **Score 1**

Criterion: Prefer shallow-water recovery sites that are not adjacent to environmentally sensitive shoreline types.

Rationale: Certain shoreline types (i.e., rock, beach, mudflat, etc.), are considered to be differentially sensitive to the effects of oil spills due to the nature of the shoreline materials, and the types and diversity of flora and fauna that live in the habitat. Environmental Sensitivity Index Maps are used by the Coast Guard as a way to characterize the potential vulnerability of such coastline features to accidental spills and the ability to clean it up. In some cases, there can be multiple shoreline categories.

Metrics: Sensitive shoreline types (Coast Guard Meeting, 4/18/01). NOAA models for a design spill to be factored in.

Range: Candidate sites were scored from 5 (high) to 1 (low) based on the following performance guidelines:

Score 5—Shoreline sensitivity index is 1–2 (exposed rocky shores and seawalls; exposed wave-cut platforms and exposed piers)

Score 4—Shoreline sensitivity index is 3–4 (fine-grained sand beaches; medium to coarse-grained beaches)

Score 3—Shoreline sensitivity index is 5–6 (mixed sand and gravel beaches; gravel beaches and exposed rip-rap)

Score 2—Shoreline sensitivity index is 7–8 (exposed tidal flats; sheltered rocky shores and coastal structures)

Score 1—Shoreline sensitivity index is 9–10 (sheltered tidal flats; wetlands)

Analysis:

Reef Runway—Shoreline sensitivity of 7; **Score 2**

Ewa Beach—Mixed coastline index; **Score 4**

Waianae Coast—Shoreline sensitivity of 4; **Score 4**

Penguin Bank—Not proximal to shore. **Score 5**

SW Molokai—Shoreline sensitivity of 4; **Score 4**

Weights

The raw scores, as defined in the tables in the previous section, were weighted in order to better reflect their true contribution to the overall performance of the mission. The weights were developed in discussion with NAVSEA and PACFLT managers and reflected the emphasis Navy decision makers placed on both the program goals and the individual criteria supporting those goals.

Program Goals

Diver safety was determined to be the number one consideration in the operation, closely followed by the success of the mission, and then public health and safety and the environment. The weight allocation broke down as follows:

Goal 1—Diver Safety—35%

Goal 2—Mission Success-25%

Goal 3—Public Health & Safety-20%

Goal 4—Environmental Sensitivity-20%

Criteria Weights

Within each goal area, supporting criteria were further weighted to reflect the value that each had on the overall goal. The breakdown, also shown on table 1, are as follows:

Goal 1—Diver Safety

- Recovery sites with favorable sea states—25%
- Recovery sites with flat/sandy bottoms—30%
- Recovery sites with minimal bottom currents—15%
- Recovery sites with controlled airspace—10%
- Recovery sites close to emergency services—20%

Goal 2—Mission Success

- Transit routes which are direct/short—25%
- Transit routes with best sea states—30%
- Transit routes with favorable seafloors—30%
- Recovery sites in proximity to technical services—15%

Goal 3—Public Health and Safety

- Recovery site proximity to Navy security—25%
- Recover site proximity to public beaches—25%
- Recovery site proximity to spill response—25%
- Recovery site proximity to aquaculture farms—25%

Goal 4—Environmental Sensitivity

- Recovery site proximity to marine sanctuaries—75%
- Recovery site proximity to sensitive coastline—25%

Scoring

Each candidate shallow-water recovery location was scored using the scoring ranges defined for each criterion defined in the Evaluative Criteria section. On the basis of raw scores, the highest to lowest rated shallow-water recovery locations were:

- Reef Runway 61
- Ewa Beach 47
- Waianae Coast 46
- Penguin Bank 38
- SW Molokai 35

The scoring was re-evaluated using the weighting factors. The weight adjusted scores were developed by simply multiplying the individual raw scores for each criterion times the criteria weight and then times the goal weight. Instead of a whole number, this leaves a fractional product. A perfect score (highest rated in each category) would provide a cumulative score for all four goals of just 5. The weight adjusted scores resulted in a modified rank order as follows:

- Reef Runway—3.88
- Ewa Beach—2.96
- Waianae Coast—2.86
- Penguin Bank—2.27
- SW Molokai—2.25

Various sensitivity analyses were run to determine the possible effect of biasing the outcome from extraordinary weighting of each goal relative to the others. Within a reasonable realm of weighting, the scores were relatively stable and the ranking was unchanged.

Reef Runway was the highest rated site for each of the program goals. Based on the cumulative scores, it was recommended that Reef Runway be carried forward in the EA as the preferred location, and that Ewa Beach and Waianae Coast also be carried forward for further detailed analyses. It is the recommendation of this study that SW Molokai and Penguin Bank be dropped from further consideration in the EA. The attributes underpinning these conclusions are summarized near the front of this report under "Findings."

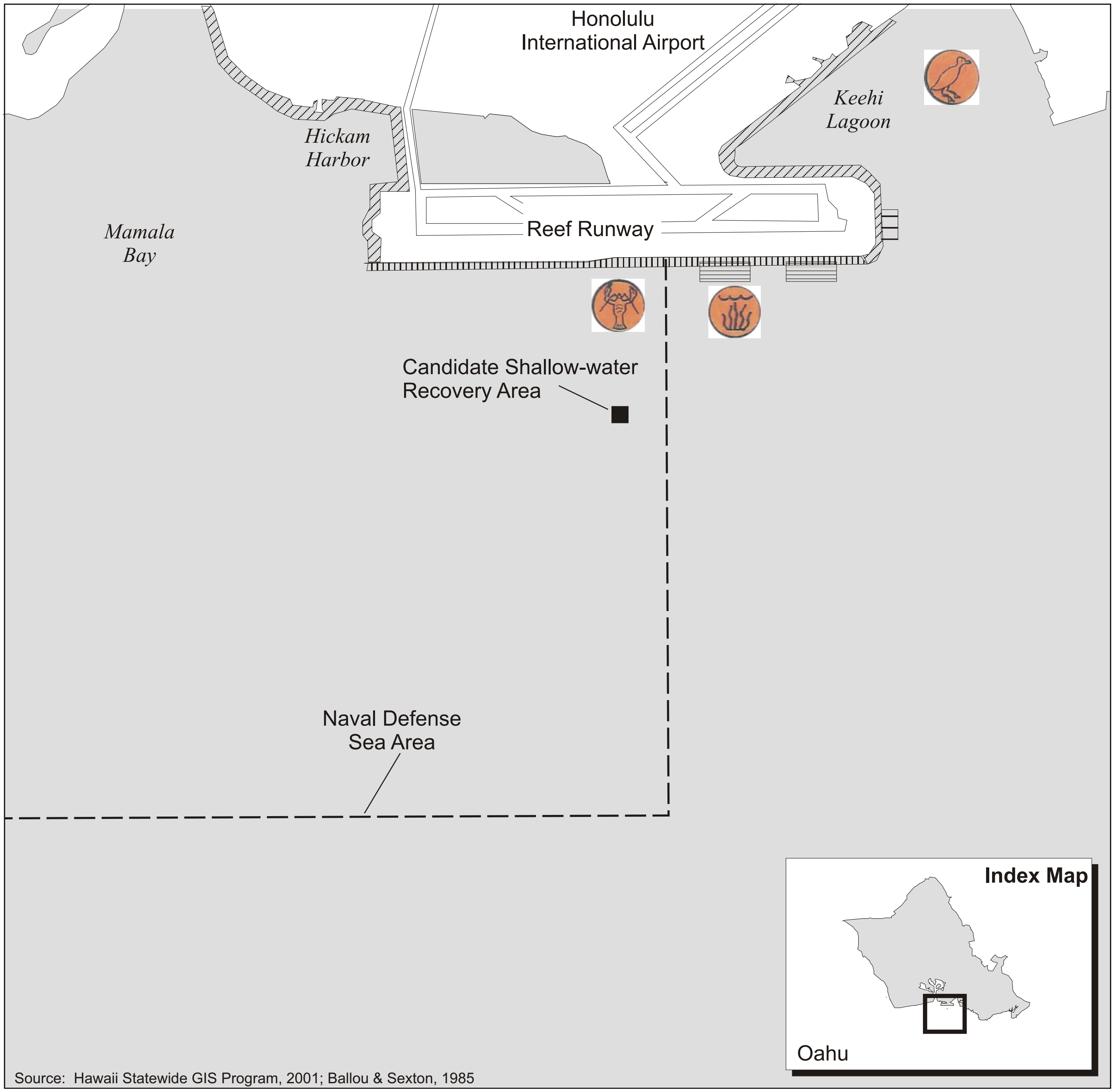
Table 1: Shallow-water Recovery Site Weights and Scores

Goal 1- Diver Safety		Reef Runway		Ewa Beach		Waianae Coast		Penguin Bank		Southwest Molokai	
Goal Weight-	35%										
Recovery sites with favorable sea states	25%	2	0.5	2	0.50	3	0.75	1	0.25	3	0.75
Recovery sites with flat/ sandy seafloors	30%	3	0.90	2	0.60	4	1.20	1	0.30	3	0.90
Recovery sites with minimal bottom currents	15%	5	0.75	5	0.75	5	0.75	3	0.45	5	0.75
Recovery sites with controlled airspace	10%	5	0.50	4	0.40	4	0.40	1	0.10	1	0.10
Recovery sites close to emergency services	20%	5	1.00	5	1.00	3	0.60	1	0.20	1	0.20
Raw Score		20		18		19		7		13	
Weighted			3.65		3.25		3.70		1.30		2.70
Goal Adjusted Score			1.28		1.14		1.30		0.46		0.95

Goal 2- Mission Success		Reef Runway		Ewa Beach		Waianae Coast		Penguin Bank		Southwest Molokai	
Goal Weight-	25%										
Transit routes which are direct/short	25%	5	1.25	4	1.00	2	0.5	5	1.25	1	0.25
Transit routes with best sea states	30%	1	0.30	1	0.90	5	0.90	3	0.90	3	0.90
Transit routes with favorable seafloors	30%	5	1.50	3	0.60	2	0.60	2	0.60	1	0.30
Recovery sites in proximity to tech services	15%	5	0.75	4	0.60	3	0.45	2	0.3	1	0.15
Raw Score		16		12		12		12		6	
Weighted			3.80		3.10		2.45		3.05		1.60
Goal Adjusted Score			0.95		0.78		0.613		0.763		0.4

Goal 3- Public Health & Safety		Reef Runway		Ewa Beach		Waianae Coast		Penguin Bank		Southwest Molokai	
Goal Weight-	20%										
Recovery site proximity to Navy security	25%	5	1.25	1	0.25	1	0.25	1	0.25	1	0.25
Recovery site proximity to public beaches	25%	5	1.25	3	0.75	2	0.50	5	1.25	4	1.00
Recovery site proximity to spill response	25%	5	1.25	5	1.25	4	1.00	2	0.50	1	0.25
Recovery site proximity to aquaculture farms	25%	4	1.00	2	0.50	2	0.50	5	1.25	5	1.25
Raw Score		19		11		9		13		11	
Weighted			4.75		2.75		2.25		3.25		2.75
Goal Adjusted Score			0.95		0.55		0.45		0.65		0.55

Goal 4- Environmental Sensitivity		Reef Runway		Ewa Beach		Waianae Coast		Penguin Bank		Southwest Molokai	
Goal Weight-	20%										
Recovery site proximity to marine sancturaries/ listed species	75%	4	3.00	2	1.50	2	1.50	1	0.75	1	0.75
Recovery site proximity to environmentally sensitive coastline	25%	2	0.50	4	1.00	4	1.00	5	1.25	4	1
Raw Score		6		6		6		6		5	
Weighted			3.50		2.50		2.50		2.00		1.75
Goal Adjusted Score			0.70		0.50		0.50		0.40		0.35
Total Score			3.88		2.96		2.86		2.27		2.25



LEGEND

- Boulder Beaches and Riprap Structures
- Exposed Tidal/Reef Flats
- Sheltered Rocky Shores/Harbor Structures
- Candidate Shallow-water Site

WILDLIFE

- Seagrasses
- Lobster
- Pelagic Bird

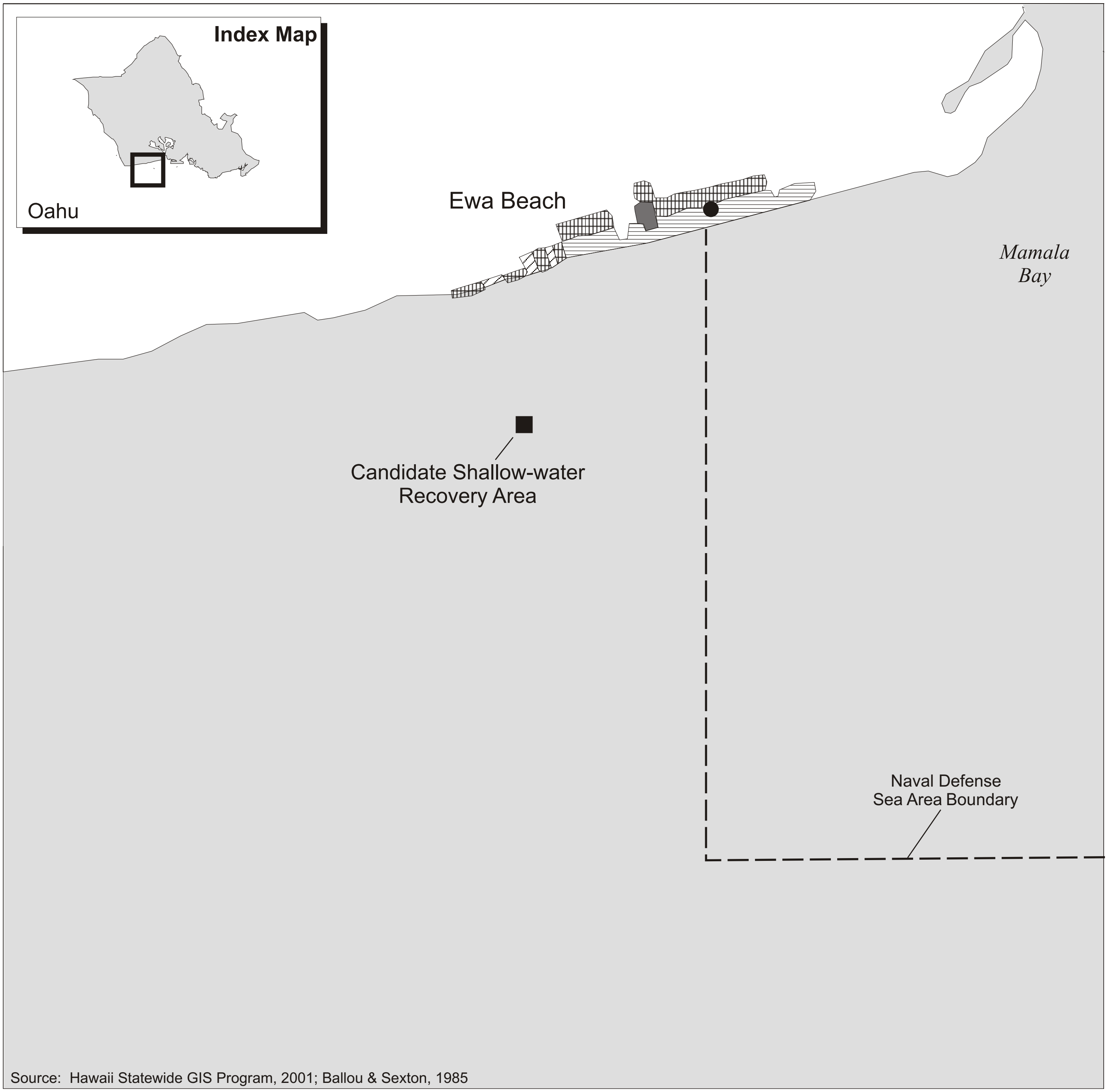
Reef Runway Site

NORTH

No Scale

Figure D-2

d2ReefRunway060501



LEGEND

- Coarse-grained Sand Beaches
- Exposed Rocky Shore and Seacliffs
- Boulder Beaches and Riprap Structures
- Exposed Wave-cut Platforms
- Candidate Shallow-water Site

NORTH

No Scale

Ewa Beach Site

Figure D-3

d3EwaBeach

Source: Hawaii Statewide GIS Program, 2001; Ballou & Sexton, 1985

LEGEND

- Boulder Beaches and Riprap Structures
- Exposed Rocky Shore and Seacliffs
- Exposed Wave-cut Platforms
- Coarse-grained Sand Beaches
- Sheltered Rocky Shores / Harbor Structures
- Candidate Shallow-water Site

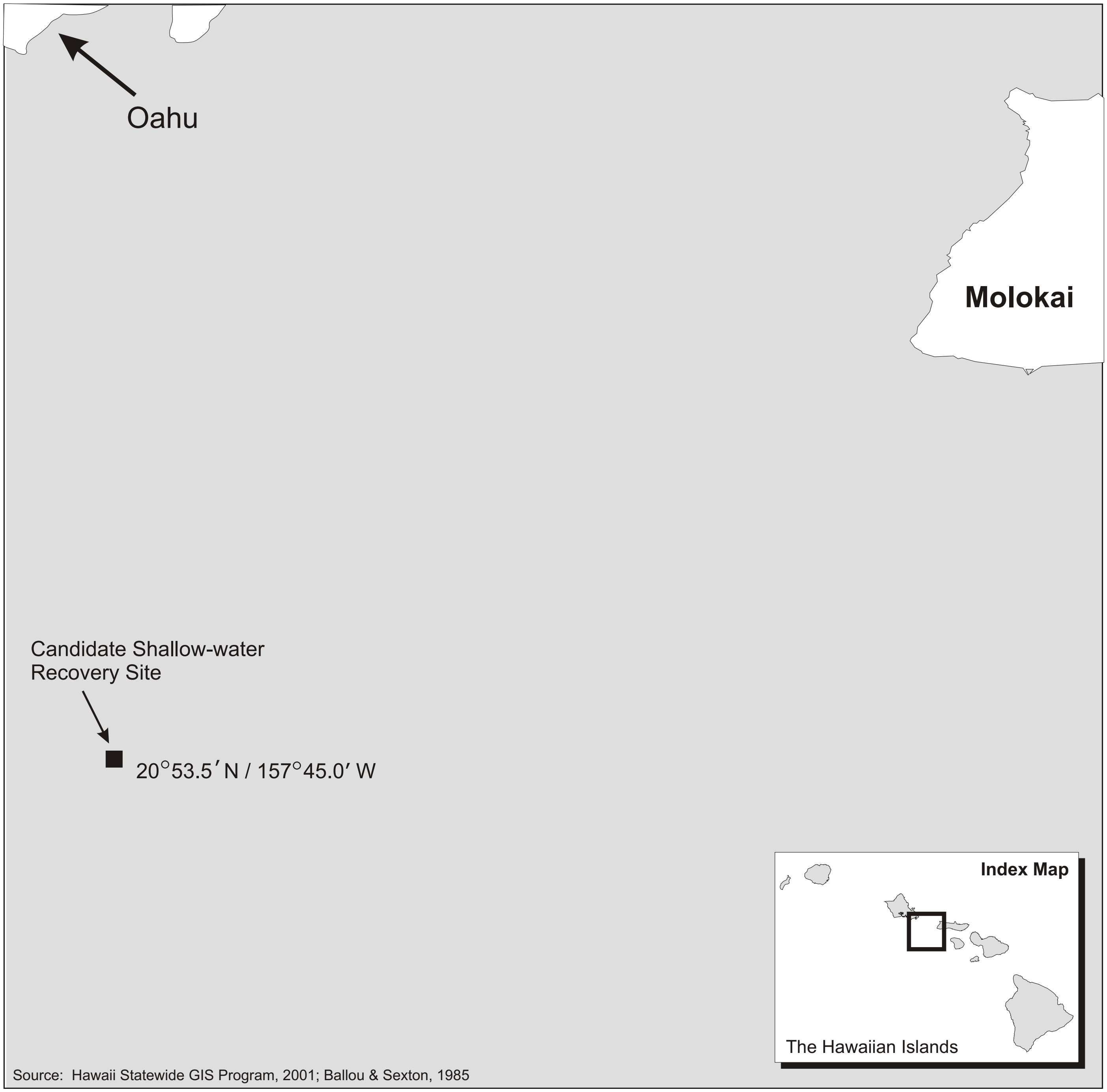
NORTH

No Scale

Waianae Coast Site

Figure D-4

d4WaianaeCoast



LEGEND

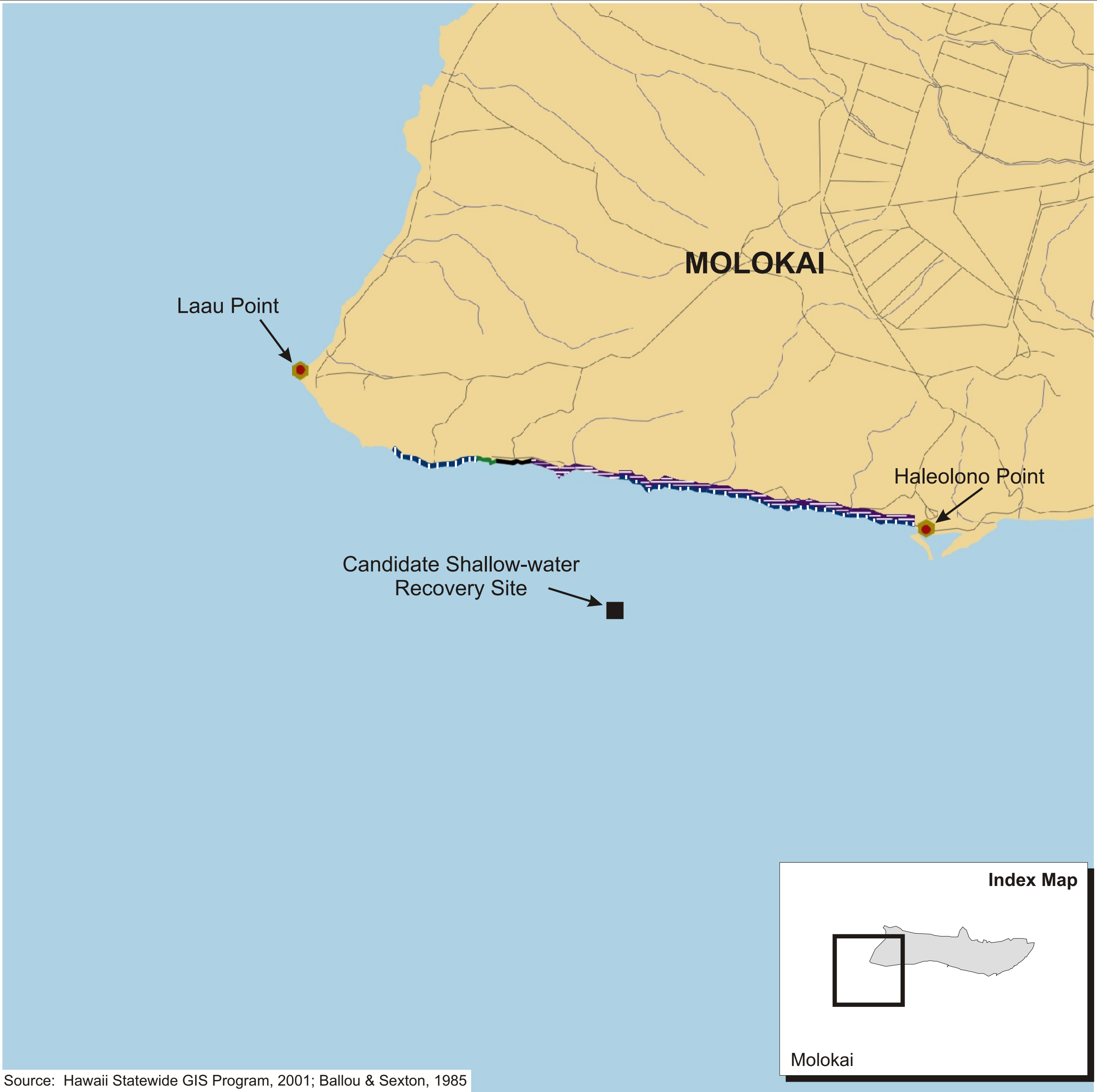
■ Candidate Shallow-water Recovery Site

Penguin Bank Site

NORTH **No Scale**

Figure D-5

D5Penguin052801



LEGEND

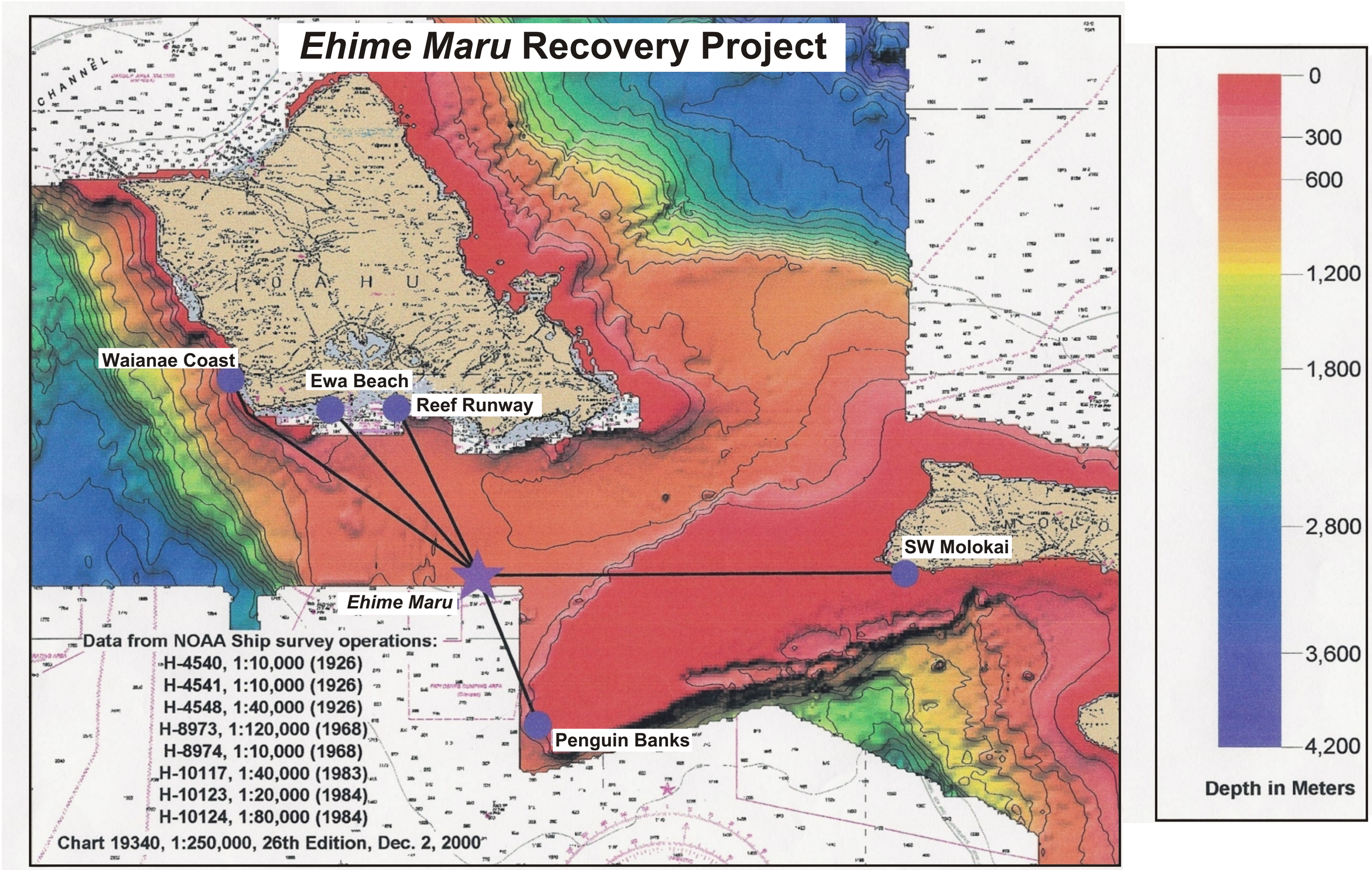
- Candidate Shallow-water Recovery Site
- Landmarks
- Boulder Beaches and Riprap Structures
- Fine-grained sand beaches
- Coarse-grained Sand Beaches
- Exposed Wave-cut platforms

SW Molokai

NORTH **No Scale**

Figure D-6

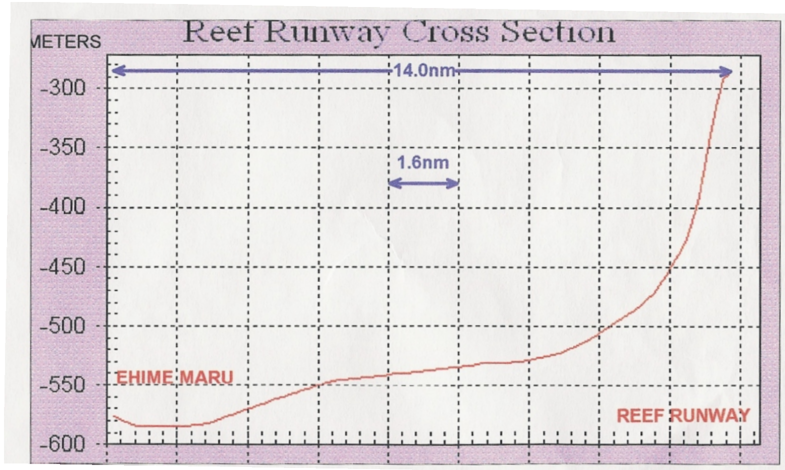
D6Molokai0052801

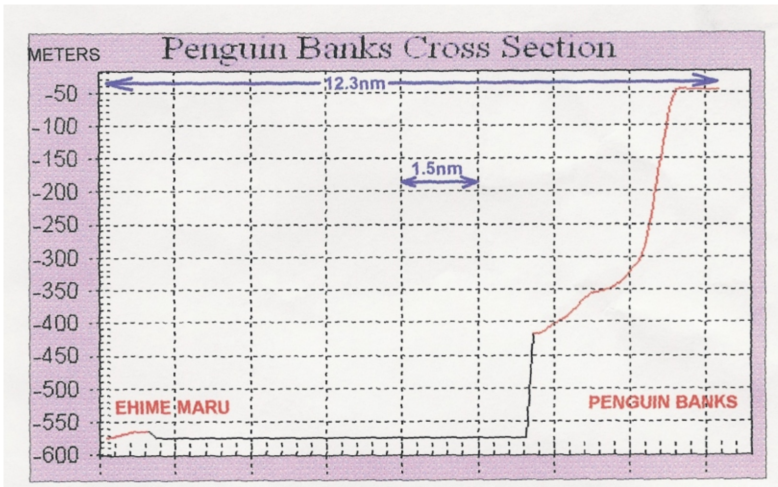


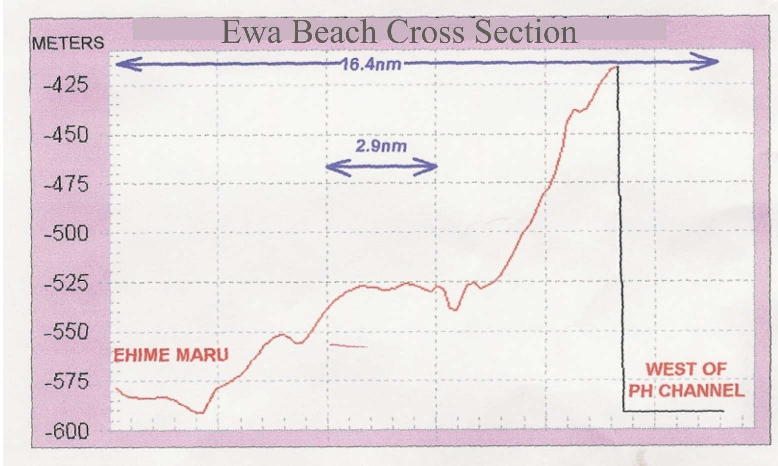
Regional Bathymetry, Map (NOAA)

Figure D-7

E_4ReefBathymetry



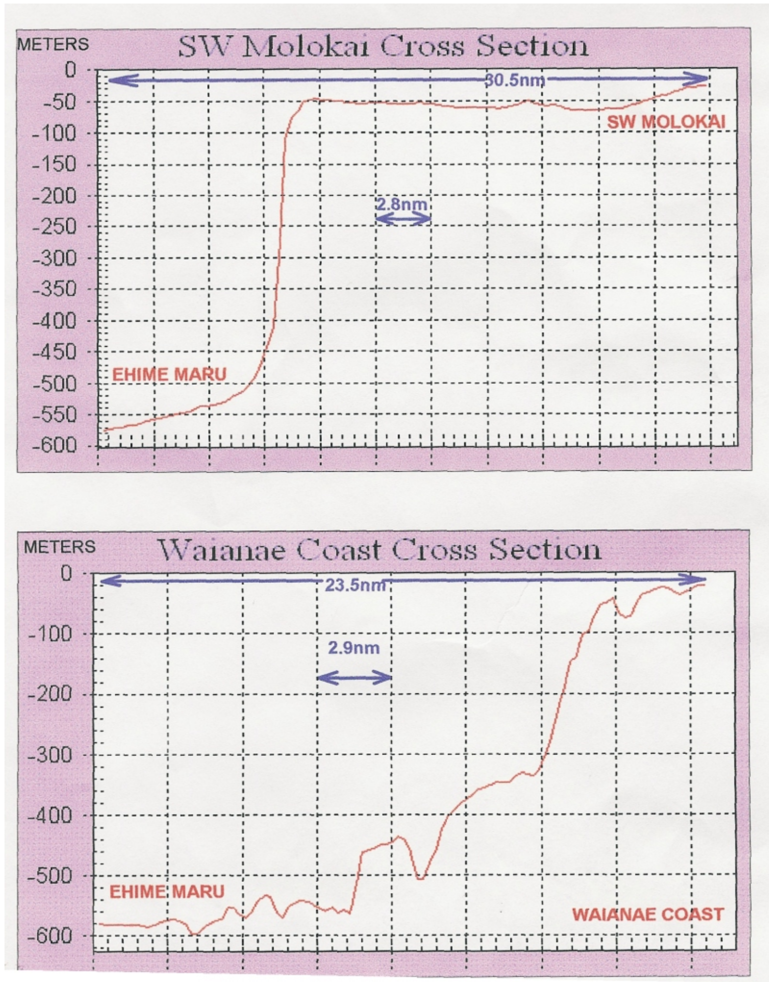




Source: National Oceanic and Atmospheric Administration, 2001a; Office of Coast Survey, Pacific Hydrographic Branch, 2001

Transit Route Profiles (Page 1 of 2)

Figure D-8



Source: National Oceanic and Atmospheric Administration, 2001a; Office of Coast Survey, Pacific Hydrographic Branch, 2001

Transit Route Profiles (Page 2 of 2)

Figure D-8

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APPENDIX E
FIELD SURVEYS PERFORMED IN SUPPORT OF SELECTING A SITE AT THE REEF RUNWAY SHALLOW-WATER RECOVERY AREA

APPENDIX E
FIELD SURVEYS PERFORMED IN SUPPORT OF SELECTING A SITE AT THE REEF RUNWAY SHALLOW-WATER RECOVERY AREA

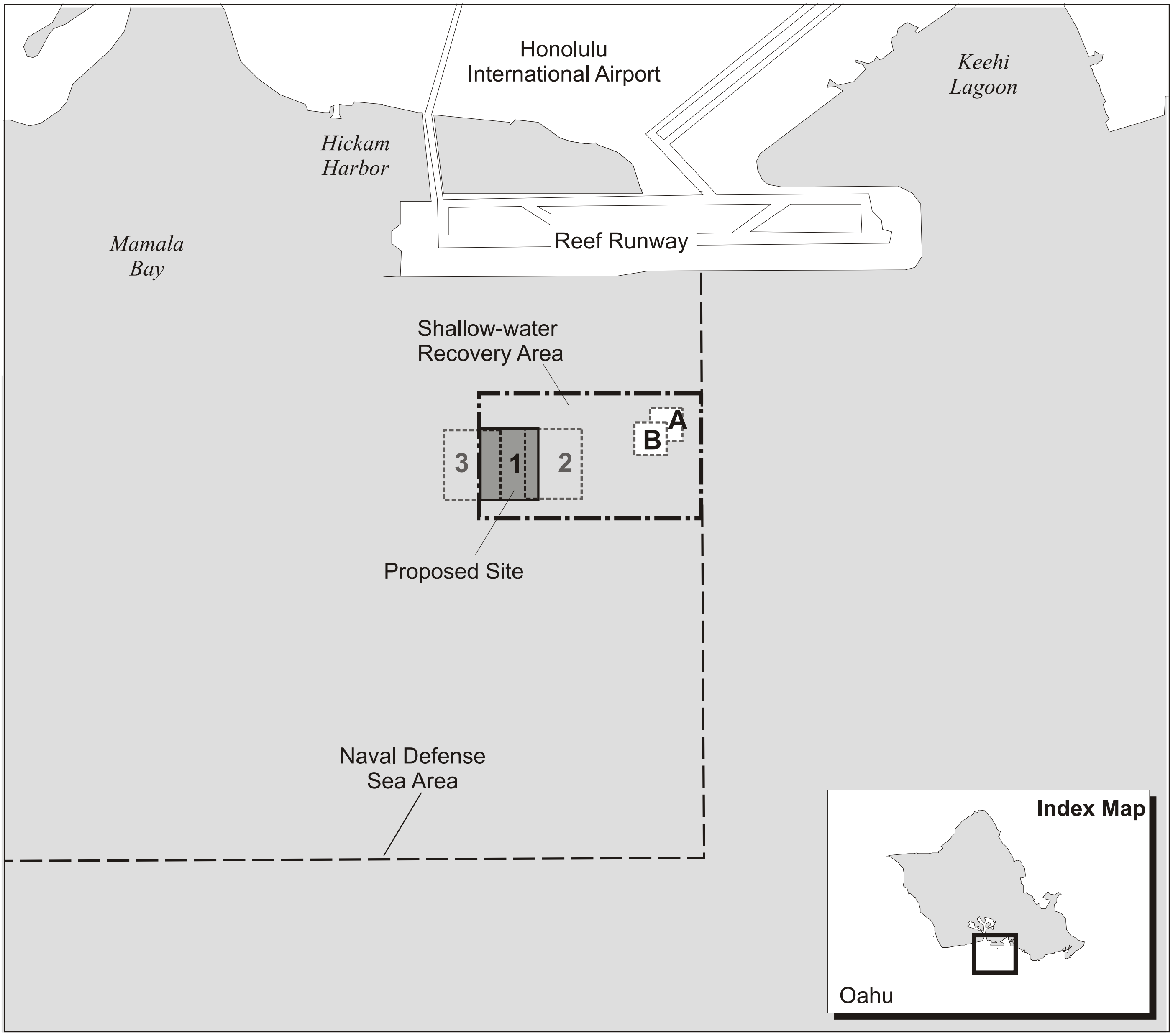
Background

This appendix discusses the scope of field activities performed in support of the Environmental Assessment and serves as a compendium for much of the baseline (spatial) data used to support the analysis and selection of a preferred site at the Reef Runway shallow-water recovery area. The results of these investigations have been incorporated into the relevant technical sections of the Environmental Assessment. The selection of the Reef Runway shallow-water recovery area as the preferred action has been documented in appendix D, Location Assessment. Appendix D established program goals, objectives and technical criteria against which five candidate shallow-water recovery sites could be compared and rank ordered. The Reef Runway shallow-water recovery area was clearly rated as the preferred site for this operation.

The Reef Runway shallow-water recovery area defines a rectangular area approximately 5,900 feet (1,800 meters) east to west, by 3,280 feet (1,000 meters) north to south. The northern boundary of the shallow-water recovery area is approximately one-half nautical mile (1 kilometer) from shore. Figure E-1 shows the relative position of the shallow-water recovery area relative to the western end of the Reef Runway at Honolulu International Airport.

The term “recovery area” denotes a broad study area within which multiple opportunities exist to “footprint” the position of *Ehime Maru* during shallow-water recovery operations, as well as accommodate the mooring system for the diving support barge. The extent of the mooring system, as defined by the anchor points, defines the outer edge of the area of greatest potential disturbance. Therefore, the optimal positioning of the mooring system dictates the selection of a “site” for the preferred action. Details of the mooring system are described in a later section. The dimensions of the current mooring plan would define a site requirement of roughly 2,100 feet (640 meters) by 1,750 feet (533 meters) (figure E-1).

The Reef Runway shallow-water recovery area was expanded to its current size as a result of changing mission requirements and the discovery of sensitive marine habitat during field studies. Early requirements for the diving operation had required a shallow-water berth for *Ehime Maru* with a seafloor depth of between 72 and 100 feet (22 and 30 meters) and a preliminary four-point mooring plan with a footprint of 1,000 feet by 1,000



LEGEND

A/B Candidate Sites - Initial 1,000- by 1,000-foot (300- by 300-meter) sites based on 72 to 100 feet (22 to 30 meters) of sea water depth requirement and preliminary mooring plan

- A - Original Navy selected location
- B - Modified location based on input from State of Hawaii Department of Land and Natural Resources, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration (National Marine Fisheries Service)

1/2/3 Candidate Sites - 1,750- by 2,100-foot (533- by 640-meter) sites based on depth of 115 feet (35 meters) of sea water and modified mooring plan.

- 1 - Preferred site based on input from State of Hawaii Department of Land and Natural Resources, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration (National Marine Fisheries Services)
- 2 - Viable secondary site - meets mission and environmental criteria
- 3 - Excluded site did not meet mission requirements

Reef Runway Shallow-water Recovery Area and Proposed Site, Oahu

NORTH

No Scale

Figure E-1

E_1RecoveryArea060101

feet (300 by 300 meters). Under this scenario, the Navy had initially identified a candidate site in the northeast portion of the current shallow-water recovery area (see box A on figure E-1). Initial bathymetric and marine habitat surveys focused on collecting data for this relatively small area. Subsequent spot dives by consultants in collaboration with State of Hawaii Department of Land and Natural Resources, U.S. Fish and Wildlife Service, and National Marine Fisheries Services personnel determined that there was sensitive seagrass habitat in the shallower, northeast portion of the site and that it would be beneficial to adjust the site to the south and west to minimize potential impacts from the operations (box B on figure E-1).

Near the mid-point of the Environmental Assessment, the depth requirement for the shallow-water berth was modified (deepened) to a depth of 115 feet (35 meters). In addition, the mooring system evolved to a 6-point system with an anchor spread of roughly 2,100 feet (640 meters) by 1,750 feet (533 meters). At that juncture, the study area was expanded to the present configuration shown in figure E-1 and field studies were restarted to assess the larger area and new criteria. Boxes 1, 2 and 3 on figure E-1 represent mission capable seafloor areas that were selected by the diving support contractor for bedding down *Ehime Maru* and successfully mooring the 450-foot (137-meter) diving support barge. Again, state and federal regulators collaborated with the Navy and Navy contractors to select the most environmentally sensitive location and mooring scheme that would satisfy the mission objectives.

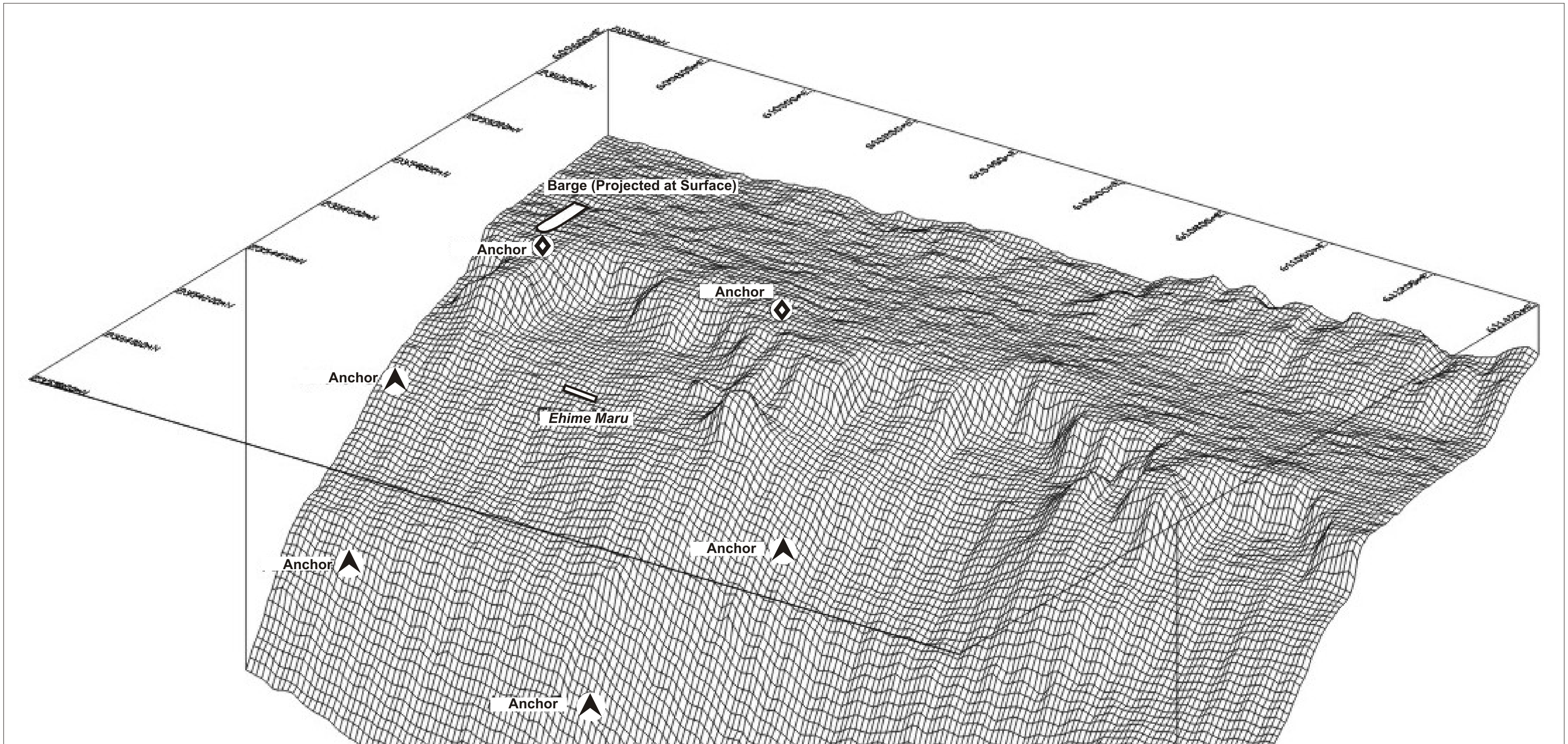
Based on this collaboration, Site 3 (figure E-1) was eliminated because it conflicted with the approach corridor to Honolulu International Airport. Sites 1 and 2, however, were deemed mission and environmentally viable. Regulators dove the two sites on May 31 and again on June 4, 2001. Based on their observations, and discussions on modifying the mooring system, Site 1 was selected as the formal Reef Runway Shallow-water Recovery Site. Figure E-2 is a 3D perspective of the site, looking northwesterly at a low-angle, and shows the relative relief of the seafloor, the position of *Ehime Maru* (and diving support barge), and the array of proposed anchor points. The reader should note that the relief in the figure has been exaggerated over 10 times in order to portray subtle seafloor features at the site and vicinity (the vertical scale is larger than the horizontal scale by 10:1).

Scope of Field Studies

As discussed, two generations of field study were completed in order to satisfy changing mission requirements. For purposes of this appendix, information will be presented as if it were performed during one operation, unless there is a notable difference in scope between the two survey efforts. Four types of studies were performed, as described below.

Bathymetric Surveys

Bathymetric data were collected on April 28, and May 9 and 10, 2001, using an Odom Hydrotract single beam echo-sounder (200 kHz transducer). A line spacing of 50 feet was used for the April 28 survey, and a line spacing of 100 feet was used for the surveys on the expanded study area on May 9 and 10. A bar check was performed to calibrate the survey system on each day prior to data collection. Bathymetry data points were collected each 0.25 seconds along each survey line, and navigation data were collected each 1



Source: Sea Engineering, 2001

LEGEND

- 8,000-pound Anchors
- Embedded Anchors

NORTH

No Scale

3-D Perspective of Mooring Plan at the Reef Runway Recovery Area

Figure E-2

second. The bathymetry and navigation data were reviewed and edited line by line using Hypack software to remove spurious data points. Data were corrected to the MLLW datum using predicted tides from the closest NOS station. All surveys were conducted in the UTM-4 (Universe Transverse Mercator, Zone 4) projection, WGS84 datum and presented at a working scale of 1:20,000.

Side-scan Sonar

Side scan sonar data were collected on May 17, 2001 using a C-Max CM800 dual frequency side scan sonar. Lines were run shoreline-parallel at a spacing of 328 feet (100 meters). Data were collected using the high frequency mode (325 kHz) at 100-meter range, giving 100 percent overlap between the survey lines. A geo-rectified sonar mosaic of the data was constructed using SonarWiz software (Chesapeake Technology, Inc.).

Marine Habitat Video Surveys

A video survey was also conducted of the seafloor using a unique system called the Sea-All (trademark) video system, that consists of a high-resolution, color video underwater camera integrated with a digital global positioning system (DGPS). The camera is aligned for a downward view of the seafloor while the survey vessel slowly moves along a defined transect line. A computer-based DGPS navigation system directs the pilot of the survey vessel along pre-planned transect lines.

The camera was maintained approximately 10 to 15 feet (3 to 5 meters) above the bottom. The camera's field of view is approximately the same width as the distance of the camera above the substrate. The DGPS coordinate information is superimposed on the video image before recording onto Hi-8 videotape. Video tapes are then analyzed and attributes assigned for each data point/coordinate surveyed.

The original site area was surveyed along transects on 100-foot (30 meter) centers, and the expanded western portion of the site was surveyed on 125-foot (38 meter) transects. These data were also compiled at 1:20,000 scale, rectified and composited with the bathymetric base map.

Sub-bottom Profiles

Sub-bottom data were collected on May 21, 2001 using an Edge Tech 0408 dual channel sub-bottom fish with a frequency range pf 0.4 to 800 kHz. Survey lines were conducted in the cross-shore direction at a spacing of 328 feet (100 meters). Isopach values were measured using the X-Star processing system.

Mooring Plan

The mooring plan has been specifically designed and engineered by Crowley Marine Services to support the mission of their diving support barge (CMC 450-10) at the Reef Runway Shallow-water Recovery Site. The mooring design is intended to provide sufficient station-keeping for conducting dive operations over *Ehime Maru* and to provide for precision positioning during the final lift operation.

The design is based on meteorological data (i.e., wind, seas, and current) as compiled by the Naval Pacific Meterological and Oceanography Center and on ocean bottom sediment distributions as remotely interpreted from sub-bottom profile surveys provided by Sea Engineering, Inc. The plan assumes 40 knots (80 kilometers per hour) of maximum wind speed and 1 knot (2 kilometers per hour) of maximum current. Preliminary data would suggest that the bottom materials consist of a layer of sand and/or coral rubble of varying thickness over a hard coral or volcanic rock substrate. The exact thickness of sand is unknown beneath the vessel and each anchor point however, isopach maps interpolated from the sub-bottom profiles indicate that there should be sufficient sand/rubble thickness to anchor the four southerly reaches of the mooring system by conventional anchors. The two northerly, or nearshore anchor reaches would not have enough sand to provide sufficient holding power. It is currently envisioned that core samples will be taken at the two northerly anchor points to evaluate material types and strengths.

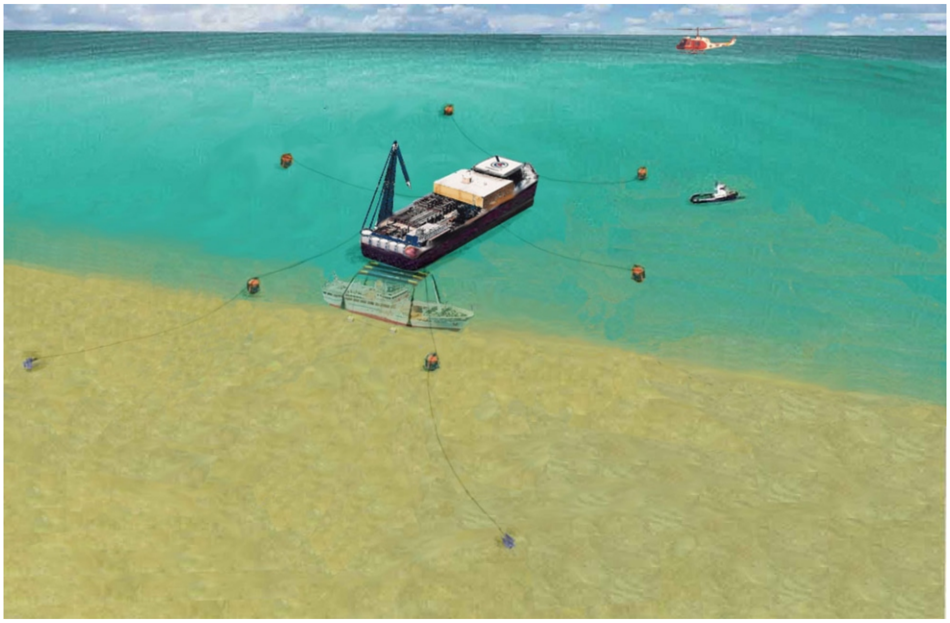
The precise coordinates (hours/minutes/tenths of a second) of the anchor points at the shallow-water recovery site are:

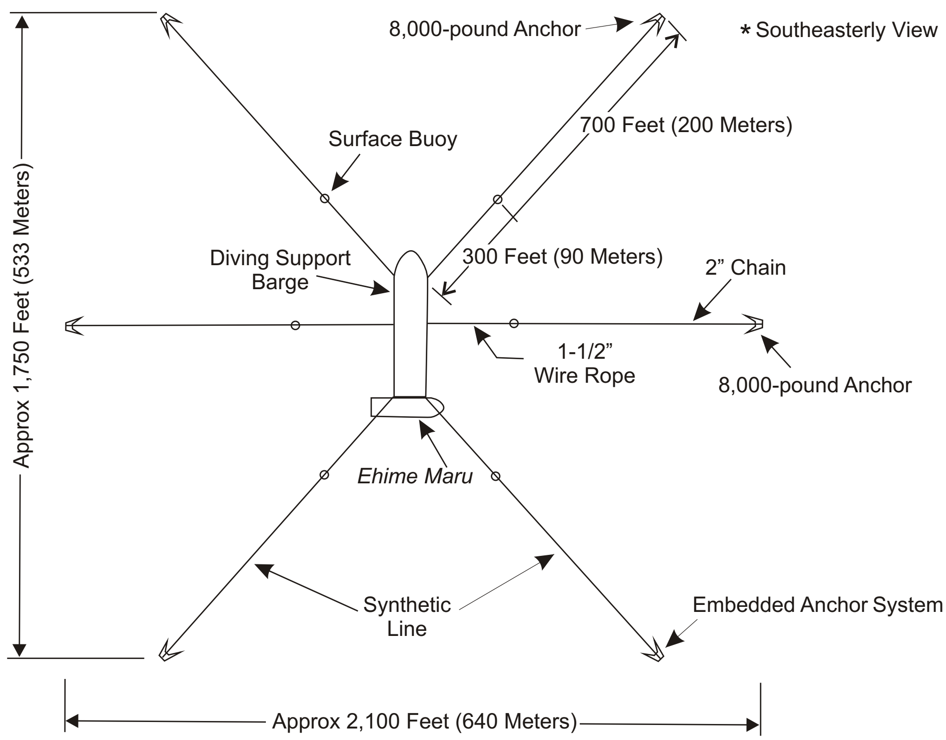
	Latitude	Longitude
Vessel:	21 17 31.3	157 56 24.2
NW Anchor:	21 17 38.4	157 56 32.1
NE Anchor:	21 17 38.2	157 56 16.2
E Anchor:	21 17 28.4	157 56 08.9
SE Anchor:	21 17 21.0	157 56 16.4
SW Anchor:	21 17 21.2	157 56 32.5
W Anchor:	21 17 29.5	157 56 35.4

Mooring System Description

The proposed plan is a hybrid six-point mooring system consisting of a combination of traditional anchor arrangements with two embedded anchor points in the hard rock areas identified above (figure E-3). The final design and exact position of the two northerly, or nearshore, embedded anchor points will be determined in part based on the results of the core analysis.

The CMC 450-10 will be fitted with three double-drum RB-90 winches. Each winch will be equipped with two 1-1/2 inch wire ropes. The two bow wires (southerly legs) and the two midship wires (port and starboard sides) will be led through swivel fairleads (guides) on deck. These wires will be connected to 50-kip (thousand pounds per square inch of force) surface buoys that will, in turn, be anchored on the bottom using 8,000-pound NAVMOOR high holding-power anchors or equivalent, and 400 to 700 feet of 2-inch oil rig quality chain. HMPE Spectra pendants (brand of special synthetic, non-stretch rope) may be added to the wire from the barge to the mooring buoys. The horizontal reach of each leg (combined length) will be approximately 1,000 feet (305 meters).





Diving Support Barge and Mooring Plan Schematic

Figure E-3

No Scale

E_3MooringPlan060401

The two stern wires (northerly legs) consisting of Spectra connecting pendants and low energy absorption components will be connected to an embedded anchor system. This system will consist of a driven piling with a suitable connection for mooring pendants. The driven piling is envisioned to be 24 inch diameter by ½inch wall thickness pipe driven to a depth of approximately 40 feet (12 meters). This method of installation will not produce spoils or debris at the penetration point. This installation will require the pile driver to position two or three 8-10 ton Danforth anchors at the nearshore position. These temporary anchors would be connected to the derrick barge by wire only and would be required for approximately two weeks. The anchors and wires can be located to minimize bottom scouring as the location of the driven pile is not a precise position. The height above the seafloor at the connection point will be optimized to eliminate any bottom scouring by the connected pendant. Upon completion of the project, the piles will be cut flush with the sea floor. Preliminary force analysis indicates that the estimated maximum static beam load is 75,000 lbs and the maximum static longitudinal load is 14,000 lbs.

Environmental Considerations

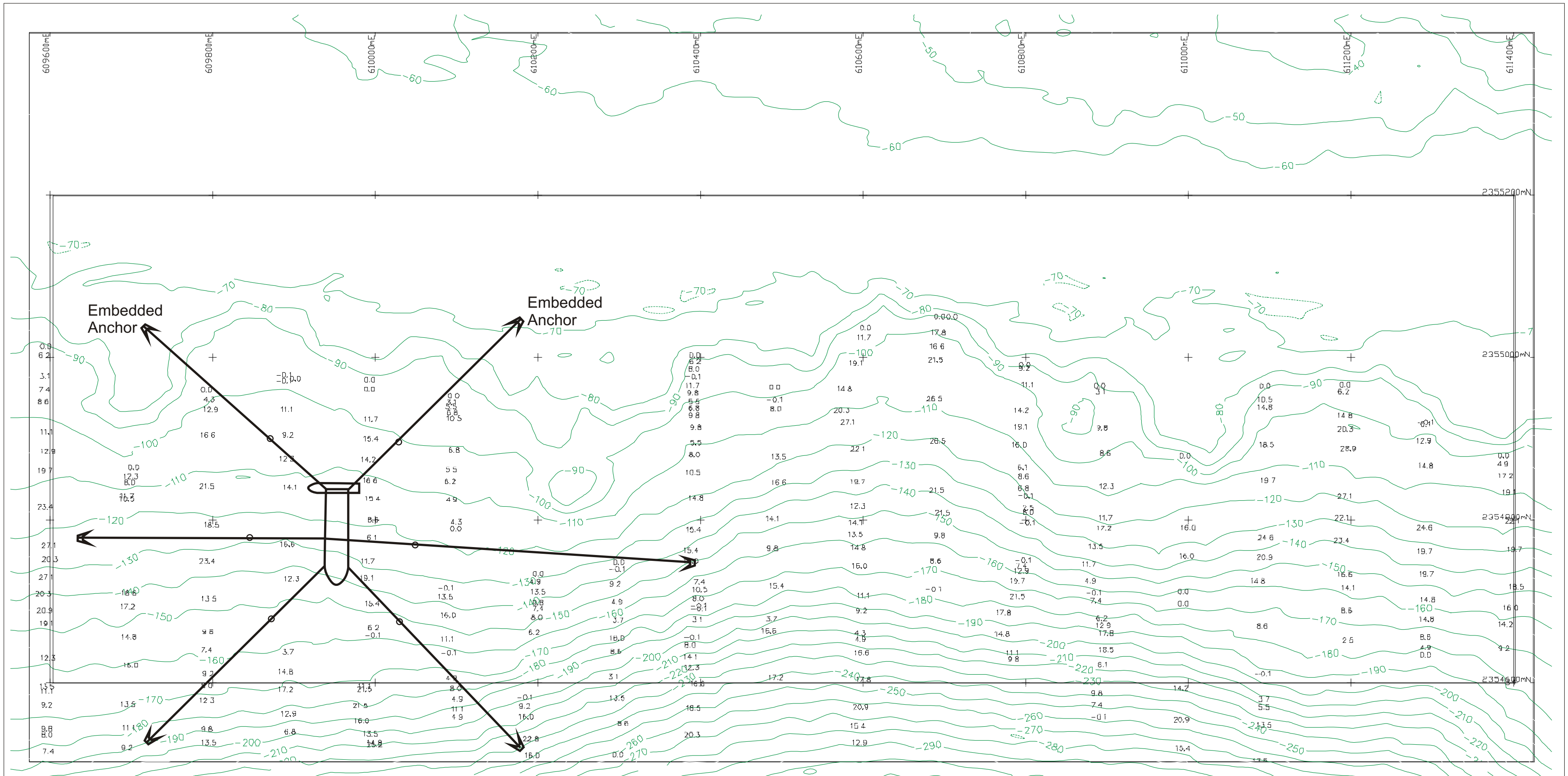
The seafloor above the 70-foot (21 meter) contour is intermittently populated by several species of seagrass, coral and other biological organisms that could be impacted by the mooring system. To the maximum extent practicable, effort will be made to design the final mooring system to minimize anchor and chain drag and to avoid setting anchors in environmentally sensitive areas. To that end, the embedded anchor system for the nearshore anchor points should all but eliminate any damage to the immediate area from bottom scouring by the anchor gear.

Salient Features of the Physical and Environmental Setting of the Reef Runway Shallow-water Recovery Area

Seafloor Morphology

The Reef Runway area seafloor can be characterized in terms of several geomorphic features. Figures E-4 and E-2 illustrate the configuration of the seafloor in plan view and 3D perspective, respectively, and the features are discussed in order from the north (shallower depths) to the south as follows.

- Upper wave cut terrace—a relatively flat, non-descript seafloor area generally above the 70- to 74-foot (21- to 23-meter) contour. The upper terrace slopes gently to the south at about 1 percent. Local relief is typically low (less than 2 feet (.6 meters) achieving maximum relief of 18 feet (6 meters) in the northeast corner.
- Wave cut escarpment—a distinct break in slope is present at about the 70 to 74 foot contour (21 to 23 meter) marking a transition between the upper terrace and a lower terrace at approximately 100 feet (30 meters). The break in slope is the back scarp of the ancient wave cut terrace developed during a glacial sea stand. The escarpment is pronounced, with a height of about 30 feet (10 meters), and slopes generally ranging from 10 to 15 percent. It bisects the study area from east to west and forms three irregular coves, and correspondingly, three southward projecting points, or lobes at the intersection of the coves. The lobes are easily detected on figures E-2 and E-4, and are discussed later for their prominence in supporting critical marine habitat.



Source: Sea Engineering, Inc., 2001

LEGEND-

Lines of Equal Depth to Seafloor (In Feet)

Seafloor Bathymetry, Reef Runway Shallow-water Recovery Area

Scale: 1:5,000

0 328 656 984 1312 Feet

0 100 200 300 400 Meters

NORTH

Figure E-4

E_4ReefBathymetry

- Lower terrace—a moderately narrow strip of seafloor between the 100- and 120-foot (30- and 37-meter) contours. The lower terrace will serve as the foundation for the hull of Ehime Maru during recovery operations. The terrace ranges from 300 to over 650 feet (91 to 198 meters) in width. Local relief is generally less than 1 foot (.3 meter), and slopes are moderate, grading toward the ocean at 3 to 7 percent. The seafloor gradient at the vessel location will be southerly at 3 to 6 percent.
- Lower slope—at around 120 feet (37 meters), the seafloor steepens to over 10 percent and plunges to great depths outside of the recovery area. The deepest portion of the recovery area is near the south central boundary at 350 feet (107 meters). The slope is relatively uniform and featureless.

Seafloor Materials

The seafloor at the shallow-water recovery area is composed of a combination of surficial sand and coral rubble over a hard substrate of coral and/or volcanic rock. Side-scan sonar transects and sub-bottom profiling was performed to attempt to map the distribution and thickness of surficial deposits (unconsolidated sand and coral rubble) at the recovery area, especially as it influenced the selection and placement of the mooring system.

Surface conditions were not conducive to producing clean side-scan sonar signatures, and although the data were interpreted, the records are not considered to be particularly good and therefore have not been included herein. The sub-bottom profiling provided better records (i.e., cleaner signatures for picking the sediment/rock interface). The results of that survey were used to develop figure E-5, an isopach map of the shallow-water recovery area. An isopach map portrays contours of equal thickness, in this case, feet of unconsolidated sediment over hard rock. As previously mentioned, the data are actually compiled and interpreted from a series of readings made along a widely-spaced (100-meter centers [300-foot]) transects. The isopach map is contoured using an interpolating program, and therefore, it is somewhat diagrammatic.

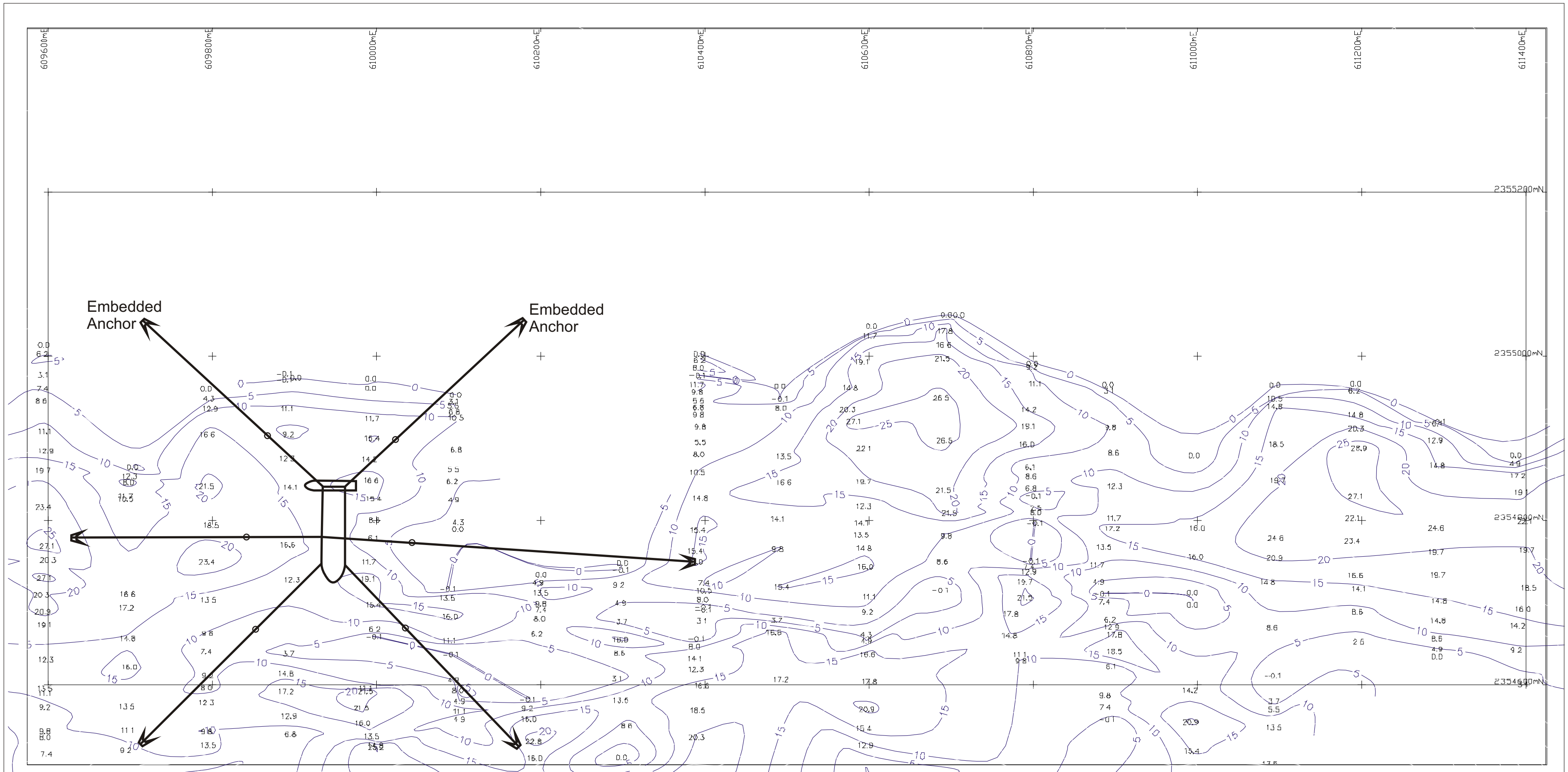
Seafloor materials are currently interpreted to be as follows:

Upper terrace—primarily limestone (old coral) overlain by a thin veneer of sand and coral rubble. The northeast corner of the study area is composed of high relief coral.

Escarpment—as above, the escarpment is primarily exposed coral and coral rubble.

Lower terrace—primarily sand and coral rubble with apparent greatest thickness near the midline of the cove areas, reaching greater than 25 feet (8 meters). The sand/coral rubble deposits thin rapidly toward the escarpment face and laterally toward the lobes, revealing exposed rock.

Lower slope—most of the slope is covered with a sand blanket that generally varies between 5 and 25 feet (2 and 8 meters).



Source: Sea Engineering, Inc., 2001

LEGEND-

—0— Lines of Equal Sediment Thickness (In Feet)

Isopach Map, Reef Runway Shallow-water Recovery Area

NORTH

Scale: 1:5,000

0 328 656 984 1312 Feet

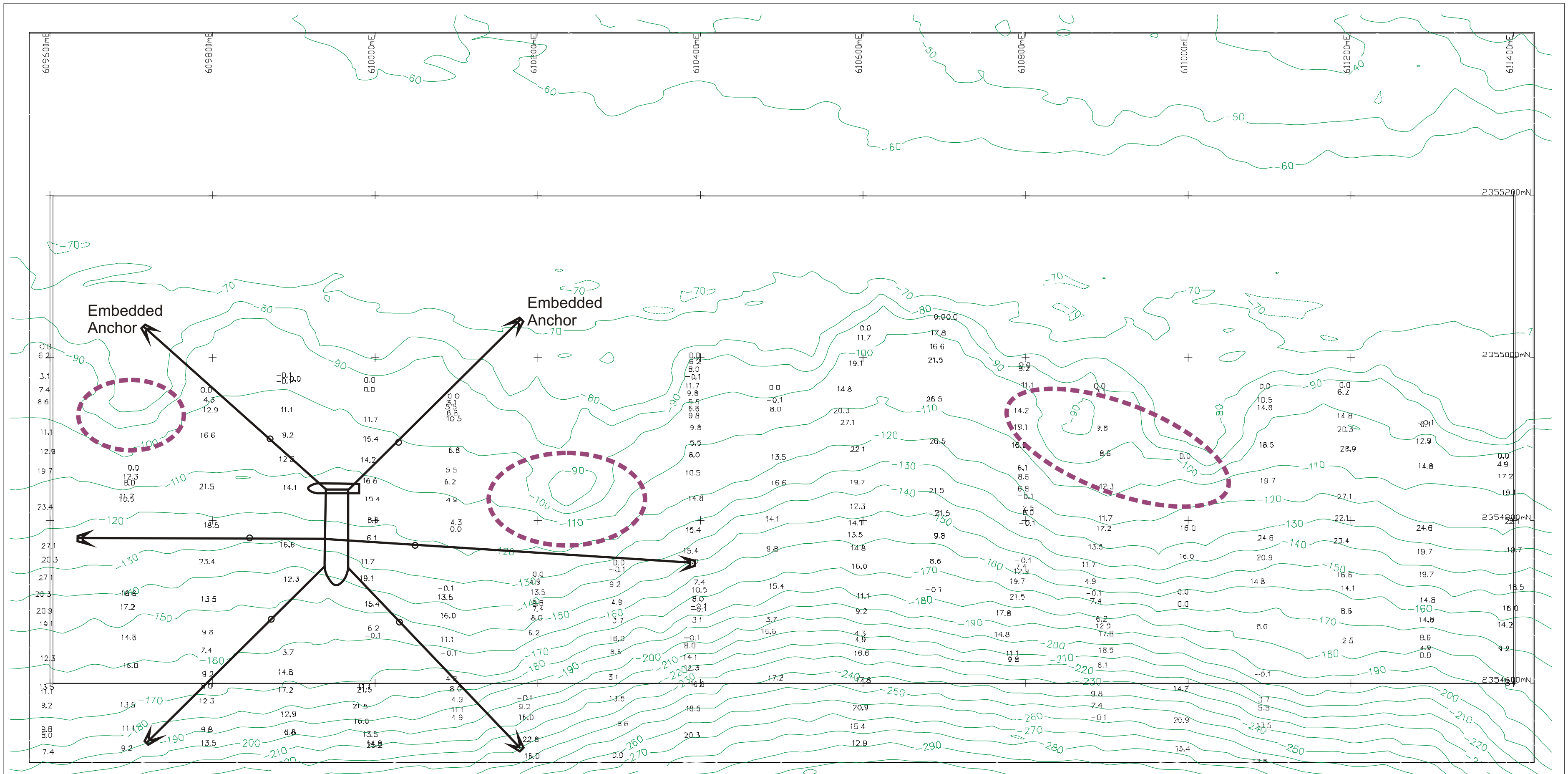
0 100 200 300 400 Meters

Figure E-5

E_5IsopackMap

Sensitive Habitat

Results of the video surveys performed at the Reef Runway shallow-water recovery area are discussed in detail in section 3.2.3 of the Environmental Assessment and in Appendix J, Marine Surveys, and are not repeated here. Figure E-6 is included to complete the suite of survey data collected to support the environmental analysis.



Source: Sea Engineering, Inc., 2001; John Naughton, (Sensitive Areas) NMFS/NOAA,2001

LEGEND-

Lines of equal depth to seafloor (in feet)

High vertical relief with good coral growth and diverse and abundant reef fish associated with caves and layers

Seafloor Bathymetry and Sensitive Resources, Reef Runway Shallow-water Recovery Area

Scale

0 328 656 984 1312 Feet

0 100 200 300 400 Meters

NORTH

Figure E-6

E_6Sensitve Habitat

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APPENDIX F
INCIDENT ACTION PLAN

INCIDENT ACTION PLAN

Incident Name: **EHIME MARU OIL SPILL RESPONSE** DRAFT

Common Contents and Field Assignments all Phases

Date Plan Prepared:	May 23, 2001	Time:	18:00 hrs.	
Operational Period*:	Beginning	1-Aug-01	06:00 hrs.	Wednesday
	Ending	31-Oct-01	06:00 hrs.	Wednesday
	Duration	90 Days		

* Subject to change based on recovery operation accomplishments

Approvals: FOSC USCG — [signature] CAPT, USCG 5/24/01

SOSC Hawaii — [signature] 5/24/01

US NAVY Incident Commander — [signature], Radm, USN 5/29/01

This plan has been prepared in accordance with 33 CFR 136 and is consistent with the National Contingency Plan and Hawaii Area Plan for the COTP Honolulu

Table of Contents

Attached Plans

RESPONSE OBJECTIVES and STRATEGIES

The Response Objectives are set by the Unified Command

* **Designates Unified Command Priorities**

* 1) **Ensure the Safety of Citizens and Response Personnel**
Identify hazards of spilled material (MSDS)
Establish site control: hot zone, warm zone, cold zone and security
Consider evacuations as needed
Establish vessel and/or aircraft restrictions
Monitor air in impacted area
Develop site safety plan for response personnel
Ensure safety briefings are conducted

* 2) **Make the Required Notifications and contact OSRO's**

USCG National Response Center	(800) 424-8802 (202) 267-2675
State of Hawaii Department of Health	(808) 586-4249 (808) 247-2191
USCG District 14 MSO office	(808) 522-8260
LEPC Local Area Planning Committee (Civil Defense)	(808) 523-4121
USN SUPSALV	(808) 423-7100
OSRO Clean Island Council	(808) 845-8465

AGENCIES: USFWS, NOAA, NMFS, and Hawaii State DLNR

* 3) **Control the Source of the Spill**
Transfer or lighter the product
Begin recovery operations
Take other actions as appropriate

4) **Manage Response Efforts in a Coordinated Manner**
Complete or confirm notifications
Establish a Unified Command and ICS organization
Ensure local and Native Hawaiian Organizations are included if necessary
Develop spill response Incident Action Plan
Ensure the mobilization and tracking of resources

* 5) **Establish Surveillance Capability**
Conduct regular overflights
Send out Observers

6) **Contain the Spilled Material**
Deploy standby oil containment boom at the Shallow-water Recovery Site
Deploy oil containment boom at appropriate collection areas
Deploy containment boom where oil may be trapped and locked ir

* 7) **Protect the Sensitive Environmental, Recreational, Economic and Cultural Areas**
Deploy geographic response plans (exclusion and deflection booming)
Identify natural resources at risk in the spill vicinity
Develop environmentally appropriate cleanup tactics
Track oil movement and develop spill trajectories

8) **Clean up the Oil from the Impacted Areas**
Conduct environmentally appropriate shoreline cleanup efforts
Clean oiled structures: piers, docks, bridges, etc.
Clean oiled boats and vessels

9) **Consider Alternative Technologies**
Dispersant application
In-situ Burning

* 10) **Recover and Rehabilitate Injured Wildlife**
Establish oiled wildlife reporting hotline, if necessary
Conduct injured wildlife search and recovery operations
Set up a stabilization unit for injured wildlife
Operate a wildlife rehabilitation center, if oiled wildlife is found

11) **Develop the Oily Waste Disposal Plan**
Locate sufficient storage for recovered oil and water
Provide dumpsters at each division for sorbent material and oiled debris
Profile the waste streams, record the quantities and arrange for disposal

12) **Establish a Damage Claims Process**

* 13) **Keep the Public Informed of the Response Activities**
Provide timely notifications of safety announcements and other actions
Establish a Joint Information Center
Conduct news briefings as appropriate
Facilitate news media access to spill response activities
Conduct public meetings and public relations program as appropriate
Provide elected officials details of the response actions

14) **Terminate the Response**
Account for personnel and equipment
Complete documentation and notifications
Evaluate planned response objectives vs. actual response (debrief)

* **Designates Unified Command Priorities**

ICS Form 203 **ORGANIZATIONAL ASSIGNMENT LIST*** June 01, 2001

INCIDENT COMMANDER AND STAFF **DRAFT**

Federal FOSC CAPT Kanazawa
State SOSC Curtis Martin
US Navy IC RADM Klemm
Japanese Rep. * *

Deputy IC Carolyn Winters USN

Safety Officer Teal Cross PENCO
Legal Officer LCDR Neil Sheehan USN
Information Officer John Yoshishige USN
D14PAO USCG
SOH PAO
Gov. Liaison Stanford Yuen USN

Agency Reps.
Hawaii DLNR Francis Oishi
USFWS John Hickey
NOAA Fisheries John Naughton

PLANNING
Section Chief Kim Beasley CIC
Deputy Pearl Cowan USN
Deputy Lt. Byrd USCG
Resources Unit USCG
Situation Unit Rocky Owens USMC
Plan Production Rusty Nall PENCO/GPC
Documentation Cynthia Pang USN
Environmental Unit Mel Kaku USN

Tech Specialists
Weather LT Ken Ingram USN
Environmental Reid Maekawa USN
Scientific Support Coord Sharon Christopherson NOAA
Facilities, Permits Karen Sumida USN
USFWS Tech Spec. Kevin Foster

LOGISTICS
Section Chief CDR Henry USN
Deputy SUPSALV
Communications Unit
Medical Unit Chief Young USN
Security Unit Capt. Smith USN
Lt. Mark Willis USCG

FINANCE
Section Chief Lyle Tom USN
Deputy Joanne Sato USN
Claims Unit Becky Hommon USN
Cost Unit

OPERATIONS
Section Chief Bill Walker SUPSALV
Deputy SUPSALV (GPC Rep)
Deputy USCG

Air Operations
Director USN N3

Staging Area
Manager TBD

Health and Safety Group
Supervisor

Salvage (Recovery) Group
Liaison LCDR. Steve Stancy USN

On Water Recovery Group
Supervisor SUPSALV (GPC Project MGR)

On Water Booming Group
Supervisor SUPSALV (GPC Assist. Project MGR)

Dispersant Application Group
Supervisor SUPSALV (GPC Rep: Dave Carter/PENCO

Division A (Shoreline Cleanup)
Supervisor

Division B (Shoreline Cleanup)
Supervisor

Wildlife Group
Supervisor Tim Sutterfield/Steve Smith USN

Surveillance Group (Air Operations)
Supervisor USN representative (N3)

Final Equipment Decon Group
Supervisor

Waste Disposal Group
Supervisor Steve Christianson USN
Kent Harrison USN

Security Group
Supervisor TBD

prepared by: Rusty Nall

* Specific personnel assignments subject to change

** Dependent on acceptance by the Government of Japan and designated represer

May 23, 2001

UNIFIED COMMAND ICS ORGANIZATIONAL CHART

DRAFT

FOSC USCG	CAPT. Kanazawa
SOSC HEER	Curtis Martin
US NAVY IC	RADM. Klemm
JAPAN REP.	* see foot note

Safety Officer	Teal Cross
Liaison Officer	Stan Yuen
Public Info Officer	John Yoshishige
Legal Officer	Neil Sheehan

Deputy IC	Carolyn Winters

PLANNING SECTION	
Section Chief	Kim Beasley
Deputy	Pearl Cowan
PlnPro & Docmnt	GPC Representative
Environmental Unit	Reid Maekawa

OPERATIONS SECTION	
Section Chief	Bill Walker SUPSALV
Deputy	GPC Representative
Deputy	USCG
Air Operations Brnch	USN Rep (N3)

LOGISTICS SECTION	
Section Chief	CDR Henry
Deputy	SUPSALV

FINANCE	
Section Chief	Lyle Tom
Deputy	Joanne Sato
Cost Unit	SUPSALV
Claims Unit	Becky Hommon

IN THE COMMAND POST

OUT IN THE FIELD

SURVEILLANCE GROUP	
Supervisor	USN rep

ON WATER RECOVERY GROUP	
Supervisor	GPC Project MGR

ON WATER BOOMING GROUP	
Supervisor	GPC Assist Project MGR
Deputy	GPC Foreman

DISPERSANT APPLICATION GROUP	
Supervisor	GPC Representative

SECURITY GROUP	
Supervisor	CAPT Smith

DIVISION A Shoreline Response	

DIVISION B Shoreline Response	

SALVAGE (RECOVERY) GROUP	
Liaison	LCDR. Steve Stancy

HEALTH AND SAFETY GROUP	
Supervisor	TBD

WASTE DISPOSAL GROUP	
Supervisor	Steve Christiansen

DECON GROUP	
Supervisor	

WILDLIFE BRANCH	
Supervisor	Tim Sutterfield
	Steve Smith USN

ICS Form 207

* Dependent on acceptance by the Government of Japan and designated representative

RESOURCES AT RISK SUMMARY

DRAFT

There is a complete discussion of the Resources at Risk for this area in the Environmental Assessment (EA) for this project

1 **Humpback Whale Sanctuary**

Potential oil release to affect sensitive species. This is a feeding area for Hawaiian Petrels and Newell's Shearwaters.

2 **Penguin Banks**

The Banks are within the Humpback Whale Sanctuary. This is a feeding area for Hawaiian Petrels and Newell's Shearwaters.

3 **Waikiki Beach**

If oil reaches the beach at Waikiki, the major effects would be due to increased difficulty of the cleanup and the interference with tourist recreation.

4 **Honolulu Harbor**

If oil enters Honolulu Harbor there is a potential to oil the intertidal channel edges, and leave oil residue on commercial and recreational boats.

5 **Keehi Lagoon**

If oil enters Keehi Lagoon there is a potential for oiling the endangered Hawaiian Black-necked Stilt and intertidal mud flats. The oil could also interfere with recreational use of the lagoon.

6 **Pearl Harbor**

If oil enters Pearl Harbor there is a potential for oiling the endangered the Hawaiian Black-necked Stilt, Hawaiian Coot, Hawaiian Duck and Gallinule. Oil entering Pearl Harbor could contaminate mud flats and mangrove areas.

7 **Ewa Beach**

If oil is inadvertently released in the Eva Beach area there could be the potential to disrupt recreational activities on the beaches. In addition, a release of oil could result in the oiling of green sea turtles.

ICS Form 232 Prepared by:

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE**			**DRAFT**
	Common Contents and Field Assignments all Phases			
Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Oct-01	0600 hrs.	Wednesday
	duration	90 Days		

HEALTH & SAFETY GROUP

Supervisor: Teal Cross

Strategies:

1) Assess and evaluate job safety standards throughout operation.

2) Update safety contingencies and procedures as required.

3) Ensure availability of emergency medical care.

4) Ensure adequate personal protective equipment is available and used.

5) Ensure air monitoring equipment is serviceable and available for use as required.

5) Develop Site-specific Spill Health & Safety Plan.

6) Develop provisions for Medical evacuation by helicopter and crew boat.

7) Conduct Daily Safety Briefings.

RESOURCES

Position	**Equipment**
Supervisor	Gastech Multi Meter
Hazmat Technician	Sensidyne Detector Kit
Hazmat Technician	Vehicle
Hazmat Technician	

Specialized Personal Protective Equipment

Nomex Suits
SCBA x 2
3/4 Rain Gear
Nitrile Gloves
Rubber Boots

prepared by:

ICS Form 206	Incident Name	date prepared June 01, 2001
MEDICAL PLAN	**EHIME MARU OIL SPILL RESPONSE**	

MEDICAL AID STATIONS	LOCATION	Paramedics YES	NO
Division A	As activated		x
Division B	As activated		x
Division C	As activated		x
Nearshore Containment Group	As activated		x

A minimum of two CPR-First Aid-qualified persons shall be on site during all work activities to handle minor injuries and basic first aid care.

Refer to Navy Diving and Salvage Operations Plan for all medical emergencies involving diving operations.

This Medical Plan shall also provide options for medical attention beyond the capabilities of on-site first aid as follows:

OFFSHORE TRANSPORTATION

The USCG Search and Rescue Center shall be notified for emergency offshore transportation via helicopter for injuries requiring immediate emergency medical attention (urgent care required) for transportation to the appropriate medical facility (below). Phone: 1-800-552-6458
The Coast Guard may also be reached on Marine VHF Radio, channel 16.

An on-site water taxi or tug (or other suitable vessel) may be utilized to transport injured personnel (non-urgent, serious injuries) to Honolulu Harbor. A pier shall be designated as a rendezvous point with a land-based ambulance at the time of transportation, depending on the location of the patient and harbor vessel traffic. An ambulance shall be dispatched to this pier for patient transportation to the appropriate medical facility (below). Typically, incidents occurring on the eastern half of Honolulu Harbor (or further) shall use Pier 4 (MSO Honolulu) as a rendezvous; incidents occurring on the western half of Honolulu Harbor (or further) shall use the Keehi Small Boat Harbor as a rendezvous, unless otherwise identified.

NEARSHORE TRANSPORTATION (Outside of Honolulu International Airport)

On-site: A small craft will be readily available at all times on the job site to transport injured personnel (any medical situation beyond the capabilities of on-site basic first aid) to rendezvous with a land-based ambulance at the Keehi Small Boat Harbor launch ramp, unless otherwise identified. This ambulance shall provide patient transportation to the appropriate medical facility (below). For on-base Pearl Harbor ambulances call 471-7117. For off-base ambulances, call 911.

SEE ATTACHED SKETCH FOR THE LOCATION
OF NEARBY EMERGENCY FACILITIES

MEDICAL FACILITIES

Queens Medical Center	1301 Punchbowl Street Honolulu, Hawaii	547-4311	24-Hr Civilian Trauma Center
Tripler Army Medical Center	1 Jarrett White Road Honolulu, Hawaii 96859-5000	433-6629	24-Hr Military Emergency Medical Care
Kuakini Hospital Emergency	347 North Kuakini Street Honolulu, Hawaii	547-9540	24-Hr Civilian Emergency Medical Care
Concentra Medical Center	545 Ohohia Street Honolulu, Hawaii	831-3000	Civilian Occupational Injury Mon-Fri 7:00 am to 5:00 pm

MEDICAL EMERGENCY PROCEDURES

When calling for assistance in an emergency, the following information should be readily available:
--Your Name and Location
--Telephone number at your location
--Type of exposure or injury
--Name of person(s) exposed or injured
--Actions already taken

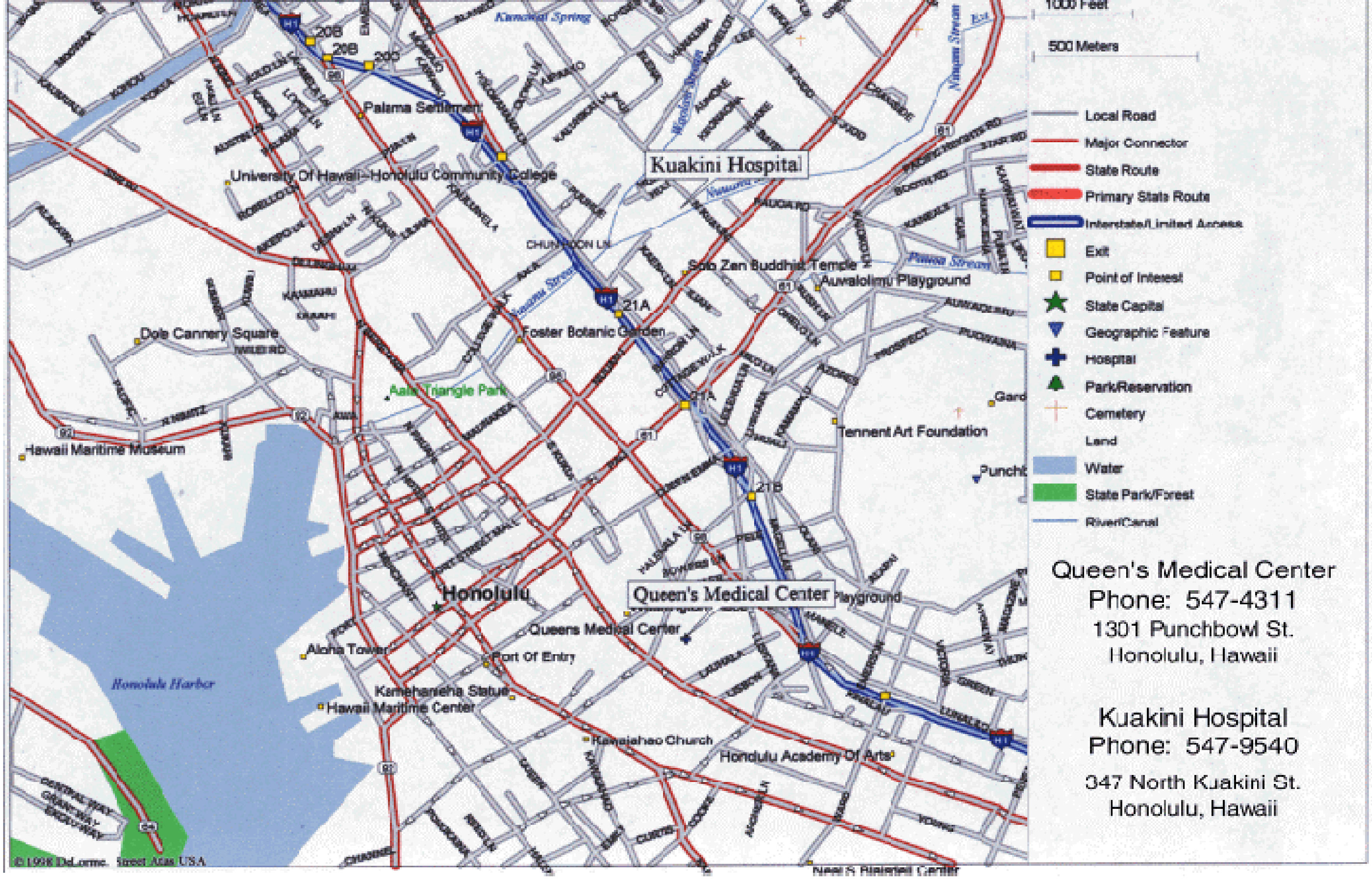
Minor injuries shall be treated on site (Basic First Aid)

For slightly more serious injuries--but the injured person is conscious and able to walk by himself-- they may be driven to the nearest medical center by another worker for medical assistance.

For any significant injury such a broken arm, a cut requiring several stitches, or anything more serious, call 471-7117 (on-base Pearl Harbor ambulances) or 911 (off-base ambulances) to arrange an ambulance rendezvous for medical attention at the appropriate medical facility (above). Emergency Medical Technicians from the ambulance shall identify the appropriate medical facility.

Report all injuries to the Safety Officer and Field Operations Division or Group Supervisors.

Honolulu Harbor Emergency Rooms



Queen's Medical Center
Phone: 547-4311
1301 Punchbowl St.
Honolulu, Hawaii

Kuakini Hospital
Phone: 547-9540
347 North Kuakini St.
Honolulu, Hawaii

Incident Status Summary

June 01, 2001

DRAFT

Source Status

Presently the vessel is not releasing any oil from the current location 9 nautical miles south of Diamond Head, Oahu.

Max Est. Aboard

45,000 gals.

Maximum credible spill

Volume Spilled gals.

Operational Period

Mass Balance

Volume Spilled		gals.
Evaporation		gals.
Dispersion		gals.
Recoverable Product		gals.

On Shore Equipment

	Vac Trucks
	Skimmers
	Other Vehicles
	Containment Boom

Waste Management

Liquid Recovered		gals.
Product Recovered		gals.
Water Recovered		gals.
Oily Solids		cu yds.

On Water Equipment

	Boats
	Boom
	Skimmers
	Vac Trucks

Shoreline Impacts

Wildlife

Safety Status

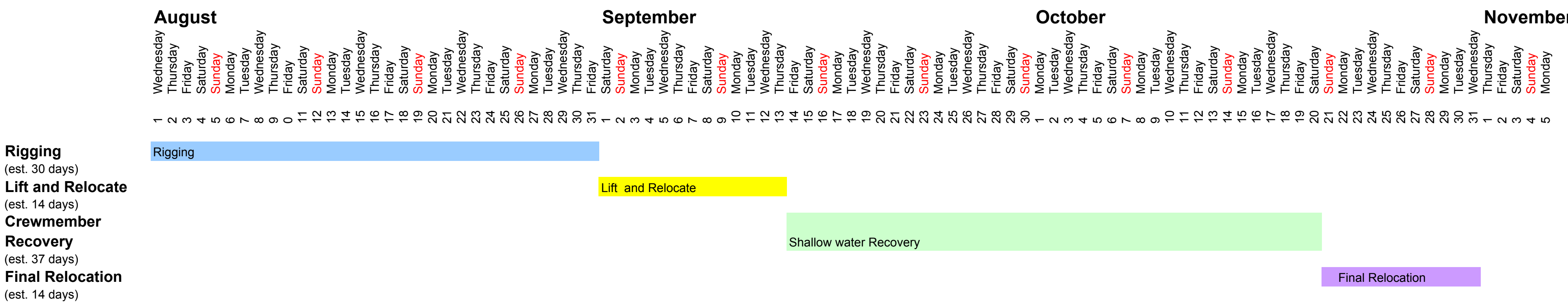
Personnel

	COMMAND Center
	Health and Safety Group
	Source Control Group
	On Water Group
	Sensitive Area Protection Group
	Division A
	Division B
	Division C
	Wildlife Group
	Surveillance Group
	Final Equipment Decon Group
	Waste Disposal Group
	Total Personnel

Prepared by:

EHIME MARU OIL SPILL OPERATIONS TIMELINE

(all days subject to recovery operation accomplishments)



EHIME MARU DEEP WATER LOCATION AND CREW MEMBER RECOVERY SITE

Location: 8 Nautical Miles South of Diamond Head

Latitude: 021* 05' North

Longitude: 157* 49' West

INCIDENT ACTION PLAN

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**
Phase III: Deep-water Rigging

Date Plan Prepared:	June 01, 2001	Time:	18:00 hrs.	
Operational Period*:	Beginning	1-Aug-01	06:00 hrs.	Wednesday
	Ending	31-Aug-01	06:00 hrs.	Sunday
	Duration	31 Days		

* Subject to change based on the recovery operation accomplishments

Approvals: FOSC USCG ______________________

SOSC Hawaii ______________________

US Navy Incident Commander ______________________

This plan has been prepared in accordance with 33 CFR 136 and is consistent with the National Contingency Plan and Hawaii Area Plan for the COTP Honolulu

Table of Contents

Attached Plans

Strategic Objectives for this Operational Period

August 1 through August 31, 2001

DRAFT

Note: It is not anticipated that any oil will be released during the rigging phase.

1 Monitor the site for evidence of a release using a helicopter.

2 Establish and maintain a Safety Zone both on the water and in the airspace above.

ICS Form 202 continued

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name: **Phase III: Deep-water Rigging** **DRAFT**

Phase III: Deep-water Rigging

Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

HEALTH & SAFETY GROUP

Supervisor: Teal Cross

Strategies:

1) Assess and evaluate job safety standards throughout operation.

2) Update safety contingencies and procedures as required.

3) Ensure availablility of emergency medical care.

4) Ensure adequate personal protective equipment is available and used.

5) Ensure air monitoring equipment is serviceable and available for use as required.

6) Develop Site-specific Spill Health & Safety Plan.

7) Conduct Daily Safety Briefings.

RESOURCES

Position	**Equipment**
Supervisor	Gastech Multi Meter
Hazmat Technician	Sensidyne Detector Kit
Hazmat Technician	Vehicle
Hazmat Technician	
	Specialized Personal Protective Equipmen
	Nomex Suits
	SCBA x 2
	3/4 Rain Gear
	Nitrile Gloves
	Rubber Boots

prepared by:

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase III: Deep-water Rigging			**DRAFT**
Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

SECURITY GROUP (Safety Zone)

Supervisor: CAPT Smith

Strategy: During the rigging phase it is not anticipated that security vessels will need to be on site. However, there will be operational requirements for Safety Zones to be established. If there is a need, a USCG Vessel will be dispatched to enforce the Safety Zone for that event.

Tactic: Broadcast a Notice to Mariners advising them of the underwater operations.

Tactic: USCG may provide periodic Security Vessel if requested.

Tactic: Generally, the Navy will use one of the vessels on site for the "Salvage" operations to provide security on the water. The USCG will provide a person on the Navy vessel if requested.

Tactic: The Federal Aviation Administration has established a controlled airspace around the sites.

Note: The security assignments will be finalized when the Navy Operations Orders are released.

Safety Message:

RESOURCES

Position	**Name**	**Equipment**
		USCG 41 ft. UTB

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase III: Deep-water Rigging			**DRAFT**
Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

SURVEILLANCE GROUP

Supervisor: USN representative

Strategy: During the rigging phase it is not anticipated that any oil will be released. The USCG will conduct overflights during its daily routine air operations. If there is reason to think oil has been released, then additional overflights will be dispatched utilizing commercial helicopters. Surveillance flights will be conducted during the mast cutting operation and if the stern is lifted to position the lifting plates.

Tactic: The USCG will provide periodic overflights of the recovery site as part of their routine daily air operations.

Tactic: The Navy will provide commercial overflights if the stern is lifted to position the lifting plates. The Navy will provide commercial helicopter overflights of the current location if oil has been released. They will assess the situation and guide the recovery operations.

Tactic: The ROV will be instructed to report any oil leaking from the vessel at depth.

Safety Message:

RESOURCES

Position	Name	Equipment
Air Support Spvr.	N3	USCG Helicopter Commercial Helicopter

ICS Form 204	FIELD ASSIGNMENTS	date prepared June 01, 2001 18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase III: Deep-water Rigging			**DRAFT**
Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

ON WATER RECOVERY GROUP

Supervisor: SUPSALV

Strategy: During the rigging phase it is not anticipated that any oil will be released. If there is reason to think oil has been released, then overflights will be dispatched to assess the situation.

This Group will not be activated during the rigging phase unless there is a release of oil. One Navy skimmer system will be on site at the current location if at any time during the rigging phase, a rudder lift is required or if the mast is cut using explosive shape charges.

Tactic: The OSRV CLEAN ISLANDS will be on "ready standby" at pier 34, Honolulu Harbor and shall be capable of being on scene and skimming within 2 - 4 hrs.

Tactic: The Navy skimmers will be on standby at the ESSM Facility in Pearl Harbor.

Safety Message:

RESOURCES

Position	Name	Contact	Equipment
Supervisor			SUPSALV Skimmer 02
Boat Operators			SUPSALV Skimmer 04
Deck Hands			SUPSALV Skimmer 95
Technicians			Monarch (SUPSALV)
			Monarch (SUPSALV)
			Work Boat (American Islander)
			Crew Boat (P&R Water Taxi)
			Crew Boat (P&R water Taxi
			Crew Boat (P&R Water Taxi)
			Crew Boat (Smith Maritime)
			RHIB Inflatable SUPSALV
			OSRV Clean Islands
prepared by:			Plenty of Sorbent Material

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**

Phase III: Deep-water Rigging

Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

ON WATER BOOMING GROUP

Supervisor: SUPSALV

Strategy: During the rigging phase it is not anticipated that any oil will be released. If there is reason to think oil has been released, then an aircraft will be dispatched.

This Group will not be activated during the rigging phase unless there is a release of oil. One Navy skimmer system will be on site at the current location if at any time during the rigging phase a lifting of the rudder is required.

Tactic: The equipment will be staged for immediate deployment at ESSM Facility Pearl Harbor.

Safety Message:

RESOURCES

Position	Name	Contact	Equipment
Supervisor			1000 ft. of Ocean Oil Boom
Boat Operators			SUPSALV Workboat
Deck Hands			SUPSALV Workboat
Technicians			Anchoring Systems

prepared by:

ICS Form 204	**FIELD ASSIGNMENTS**			June 01, 2001

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** **Phase III: Deep-water Rigging**			**DRAFT**
Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

DIVISION "A" EWA BEACH

Supervisor:

Strategy: Ewa Beach is to the West of Pearl Harbor. With the prevailing weather during the Shallow water Removal phase of the operations, if oil is released the trajectories indicate the majority of the oil will move parallel to the shoreline and out to open ocean. However, if there is an impact, then shoreline response will be necessary. Therefore, the following tactics will be identified and done if required.

Tactic: Responders will place sorbent sweep along the shoreline to adsorb any oil that may wash ashore.

Tactic: Responders will collect any oiled debris from along the shoreline.

Tactic: Establish Zone Control and set up Divisional Personnel Decon Stations.

Task (Night Shift):

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions.

RESOURCES

Position	Name	Equipment
Division Supervisor		Oil spill Response Van Flatbed Truck Sorbent Sweep

prepared by: Rusty Nall

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase III: Deep-water Rigging			**DRAFT**
Operational Period:	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

WILDLIFE GROUP

Supervisor:

Strategy: If significant quantities of oil are released, then implement the Wildlife Management Plan.

Tactic: Conduct a pre-operational survey of the appropriate bird colonies to establish existing conditions.

Tactic: If oil is released, monitor appropriate bird colonies and feeding areas to assess and collect oiled birds.

Tactic: If oil is released, observe site for potential wildlife in area and impacts.

Tactic: Set up the CIC Bird Stabilization Unit at an appropriate facility per the Wildlife Management Plan one to two days prior to the lift.

Safety Message:

RESOURCES

Position	Name	Equipment
		Bird Stablization Unit Big Boom Truck or Crane Tractor Trailer

prepared by: Rusty Nall

ICS Form 204

FIELD ASSIGNMENTS

date prepared
June 01, 2001
18:00 hrs.

Incident Name: **EHIME MARU OIL SPILL RESPONSE**
Phase III: Deep-water Rigging

DRAFT

Operational Period:			
beginning	1-Aug-01	0600 hrs.	Wednesday
ending	31-Aug-01	0600 hrs.	Sunday
duration	31 Days		

EQUIPMENT DECON GROUP

Supervisor:

Strategy: If a spill occurs, then the Equipment Decon will be done at the ESSM Facility at Bishop Point, Pearl Harbor or a second location would be at Victory Dock on the Pearl City Peninsula.

Tactic: Establish a vessel decontamination area at the ESSM Facility or alternatively at Victory pier on the Pearl City Peninsula. The vessels hulls should be wiped with "hand cleaner" to remove the oily film if necessary.

Tactic: All oil booms must be cleaned before returning them to inventory. A boom cleaning station must be set up at the ESSM Facility at Bishop Point, Pearl Harbor.

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions. Be considerate of the local residents, it's their back yard. A neat site is a safe site.

RESOURCES

Position	Name	Equipment
Division Supervisor		

prepared by: Rusty Nall

ICS Form 204	**DECONTAMINATION PLAN**	June 01, 2001 11:00 hrs

Incident Name: **Ehime Maru Recovery** **DRAFT**
Phase III: Deep-water Rigging

Operational Period:	beginning	14-Sep-01	0600 hrs	Friday
	ending	21-Oct-01	0600 hrs	Sunday
	duration	37 days		

Safey Message: All work is to be performed with consideration for Heat Stress Reduction issues. The Site Safety and Health and Medical plans must be reviewed prior to work.

VESSEL DECONTAMINATION GROUP

Supervisor: Steve Christiansen
USCG Rep: As assigned.

VESSEL DECONTAMINATION

1. Oiled vessels shall be gross decontaminated at the spill site to the greatest extent possible to prevent the spread of contamination from the spill site. Gross decon shall include:
   a. Wipe down exterior hull with sorbent materials (avoid pinch-points).
   b. Wipe down contaminated equipment (on-deck) with sorbent materials.
   c. Wipe down contaminated deck areas with sorbent materials.

2. Shift vessel to Pearl Harbor Decon Staging Area (Pearl Penninsula) or Navy ESSM base at Bishop Point. Vessel shall be immediately boomed (360 degrees) with harbor boom.

3. Unload all contaminated equipment to shore for land-based decon.

4. Using a mild degreasing solution (Simple Green or similar), brush and/or wipe contaminated areas aboard vessel. NOTE: Special care shall be taken to minimize the possibility of liquids leaving the vessel's deck.

5. Rinse vessel with fresh water.

6. Using a mild degreasing solution (Simple Green or similar) on sorbent materials, wipe contaminated areas of external hull.

7. All wastes generated shall be disposed in accordance with the Disposal Plan.

EQUIPMENT DECONTAMINATION

1. Equipment shall be decontaminated within a containment area ung a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

2. Ocean boom shall be decontaminated using a scaffold system within containment using a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

3. All wastes generate

INCIDENT ACTION PLAN

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**
Phase IV: Lift and Relocate to Shallow Water

Date Plan Prepared:	June 01, 2001	Time:	18:00 hrs.	
Operational Period*:	Beginning	1-Sep-01	06:00 hrs.	Saturday
	Ending	14-Sep-01	06:00 hrs.	Friday
	Duration	14 days		

* Subject to change based on recovery operations

Approvals:

FOSC USCG ______________________________

SOSC Hawaii ______________________________

US NAVY Incident Commander ______________________________

This plan has been prepared in accordance with 33 CFR 136 and is consistent with the National Contingency Plan and Hawaii Area Plan for the COTP Honolulu

Table of Contents

Attached Plans

Health and Safety Plan
Decanting Approval Letter
Wildlife Management Plan
Public Affairs Plan
Oily Waste Disposal Plan
Dispersant Application Plan

Strategic Objectives for this Operational Period

Phase IV: Lift and Relocate to Shallow Water

September 1 through September 14, 2001

DRAFT

1 Monitor the site for evidence of a release using a helicopter.

2 Deploy three skimming systems to the present location of the EHIME MARU and be prepared to recover any oil that may be released during the lifting opertion.

3 Follow the ROCKWATER 2 with the EHIME MARU beneath it to the Shallow-water Recovery Site.

4 Maintain a high level of readiness at the Shallow-water Recovery Site for the first 24 hours. After the vessel stablizes, and if no oil is observed, then only one Navy skimmer will be left on scene with the two other Navy skimmers on standby at the ESSM Facility and the OSRV CLEAN ISLANDS on standby at Pier 34 in Honolulu Harbor.

5 Establish and maintain a Safety Zone both on the water and in the airspace above.

6 Pre-position Navy boom for appropriate boom configuration when ROCKWATER 2 arrives at Shallow-water Recovery Site.

Note: The Lift and Transit Phase will be complete after the ROCKWATER 2 has been disconnected from the EHIME MARU.

ICS Form 202 continued

		date prepared
ICS Form 204	**FIELD ASSIGNMENTS**	June 01, 2001
		18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase IV: Lift and Relocate to Shallow Water			**DRAFT**
Operational Period:	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

HEALTH & SAFETY GROUP

Supervisor: Teal Cross

Strategies:

1) Assess and evaluate job safety standards throughout operation.

2) Update safety contingencies and procedures as required.

3) Ensure availability of emergency medical care.

4) Ensure adequate personal protective equipment is available and used.

5) Ensure air monitoring equipment is serviceable and available for use as required.

6) Develop Site-specific Spill Health & Safety Plan.

7) Conduct daily safety briefings.

RESOURCES

Position	**Equipment**
Supervisor	Gastech Multi Meter
Hazmat Technician	Sensidyne Detector Kit
Hazmat Technician	Vehicle
Hazmat Technician	
	Specialized Personal Protective Equipment
	Nomex Suits
	SCBA x 2
	3/4 Rain Gear
	Nitrile Gloves
	Rubber Boots

prepared by:

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU SPILL RESPONSE** Phase IV: Lift and Relocate to Shallow Water			**DRAFT**
Operational Period:	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

SECURITY GROUP

Supervisor:

Strategy: During the Lifting and Transit phase, there will probably be high public and media interest. Therefore, a moving Safety Zone will need to be established by the USCG. A USCG Vessel will be dispatched to enforce the moving Safety Zone during this phase of the operation.

Tactic: Broadcast a Notice to Mariners advising them of the underwater operations.

Tactic: USCG will provide an escort Vessel on scene at all times during this phase of the operation.

Tactic: Generally, the Navy will use one of the vessels on site for the "Salvage" operations to provide security on the water. The USCG will provide a person on the Navy vessel if requested.

Tactic: The Federal Aviation Administration has established a controlled airspace around the sites.

Note: The security assignments will be finalized when the Navy Operations Orders are released.

Safety Message:

RESOURCES

Position	**Name**	**Equipment**
		USCG 41 ft. UTB

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase IV: Lift and Relocate to Shallow Water			**DRAFT**
Operational Period:	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

SURVEILLANCE GROUP

Supervisor: N3

Strategy: Provide periodic surveillance capability with helicopters during the lifting and transit operations to look for oil released during the lift and relocate operations. If any oil is observed, then the helicopters will be used to direct the skimmer operations.

Tactic: The NAVY will provide periodic surveillance capability with a commercial helicopter during the lifting and transit operation. The Helo Base will be at the Honolulu International Airport. The first overflight will be scheduled when the ROCKWATER 2 takes a strain on the EHIME MARU. Helicopter overflights will be conducted on a periodic basis as required, with a minimum of two flights a day, one in the morning and one in the late afternoon.

Tactic: The USCG will provide periodic surveillance capability during the lifting and transit operations using their helicopter as part of its routine daily mission.

Tactic: The ROV will be instructed to report any oil leaking from the vessel at depth.

Safety Message:

RESOURCES

Position	Name	Equipment
Air Support Spvr.	N3	USCG Helicopter
UC Observer		Commercial Helicopter

Night Shift

ICS Form 204	FIELD ASSIGNMENTS	date prepared June 01, 2001 18:00 hrs.

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**
Phase IV: Lift and Relocate to Shallow Water

Operational Period:				
	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

ON WATER RECOVERY GROUP

Supervisor: SUPSALV

Strategy: It is the responsibility of the On Water Recovery Group to position the US Navy SUPSALV Marco skimmers and the OSRV Clean Islands to be in optimal position to recover any oil that may rise to the surface during the Lift and Transit operations. These three skimmers will be on scene when the lift begins.

Tactic: Position the two USN SUPSALV skimmers down wind and down current of the recovery operations. In the event of a release, recover the product. Follow any instructions given by the aerial surveillance group.

Tactic: The OSRV Clean Islands will stand by onsite during the entire lifting and transit phase. It will use an infrared camera to look for oil at night. The CLEAN ISLANDS shipboard dispersent system will be available with an adequate supply of Corexit 9500 or Corexit 9527 dispersant. The use of dispersants will require approval from the FOSC. No dispersant application at night.

Tactic: The third SUPSALV skimmer will be on standby at the ESSM facility in Pearl Harbor.

Note: If no oil is observed then the SUPSALV skimmers may return to the ESSM facility at nightfall and be placed in the standby mode until the next morning.

Note: The Lift and Transit Phase will end when the ROCKWATER 2 disconnects from the EHIME MARU. This will be about 24 hours after the vessel is placed on the bottom.

RESOURCES

Position	Name	Contact	Equipment
Supervisor			SUPSALV Skimmer 02
Boat Operators			SUPSALV Skimmer 04
Deck Hands			SUPSALV SKImmer 95
Technicians			Monarch
			Monarch
			Crew Boat
			Crew Boat
			Crew Boat
			Crew Boat
			Crew Boat
			Rhib Inflatable SUPSALV
			OSRV Clean Islands
prepared by:			Plenty of Sorbent Material

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** April 28, 2001

18:00 hrs.

Incident Name: **EHIME MARU SPILL RESPONSE** **DRAFT**

Phase IV: Lift and Relocate to Shallow Water

Operational Period:				
	beginning	1-Aug-01	0600 hrs.	Wednesday
	ending	31-Aug-01	0600 hrs.	Sunday
	duration	31 Days		

ON WATER BOOMING GROUP

Supervisor: SUPSALV

Strategy: The weather constraints placed on the Lift and Relocate Phase of the operation make it unlikely that any oil, if released will move toward shore. However, the assets necessary to implement the protective booming strategies identified in the Hawaii area Plan will remain on standby.

This Group will not be activated during the Lift and Relocate Phase unless there is a release of oil.

Task: Pre-position boom at the shallow-water site 24 hours prior to ROCKWATER 2 arrival.

Safety Message:

RESOURCES

Position	**Name**	**Contact**	**Equipment**
Supervisor			1000 ft. of Ocean Oil Boom
Boat Operators			SUPSALV Workboat
Deck Hands			SUPSALV Workboat
Technicians			Anchoring Systems
			CIC Small Boats
			CIC Oil Boom
			PENCO Small Boats
			PENCO Oil Boom

prepared by:

ICS Form 204	**FIELD ASSIGNMENTS**			June 01, 2001 18:00 hrs.
Incident Name:	**EHIME MARU OIL SPILL RESPONSE** **Phase III: Deep Water Rigging**			**DRAFT**
Operational Period:	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

DIVISION "A" EWA BEACH

Supervisor:

Strategy: Ewa Beach is to the West of Pearl Harbor. With the prevailing weather during the Shallow-water Removal phase of the operations, if oil is released, the trajectories indicate the majority of the oil will move parallel to the shoreline and out to open ocean. However, if there is an impact, then shoreline response will be necessary. Therefore, the following tactics will be identified and done if required.

Tactic: Responders will place sorbent sweep along the shoreline to adsorb any oil that may wash ashore.

Tactic: Responders will collect any oiled debris from along the shoreline.

Tactic: Establish Zone Control and set up Divisional Personnel Decon Stations.

Tactic (Night Shift):

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions.

RESOURCES

Position	Name	Equipment
Division Supervisor		Oil spill Response Van Flatbed Truck Sorbent Sweep

prepared by: Rusty Nall

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase IV: Lift and Relocate to Shallow Water			**DRAFT**
Operational Period:	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

DISPERSANT APPLICATION GROUP

Supervisor:

CIC Dave Carter

Strategy: The FOSC must authorize the use of dispersants. This Group will only be activated if the FOSC approves use of dispersants. If dispersants are used, a *DISPERSANT PLAN w*ill be developed, coordinated with the Natural Resources trustees, and then implemented*.*

Tactic: The Dispersant Application Bucket System will be on standby at the Clean Islands Council warehouse during the Lift and Transit operations.

Tactic: A vessel-mounted dispersant system will be onboard the OSRV CLEAN ISLANDS.

Note: No dispersant application at night.

Note: The Lift and Transit Phase will end when the ROCKWATER 2 disconnects from the spreader assembly on the EHIME MARU. This will be about 24 hours after the vessel is placed on the bottom.

Safety Message:

RESOURCES

Position	Name	Equipment
		Dispersant Helicopter
		Spotter Helicopter
		Observer Helicopter
		Dispersant Bucket No. 1
		Dispersant Bucket No. 2
		Dispersant Trailer

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase IV: Lift and Relocate to Shallow Water			**DRAFT**
Operational Period:	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

WILDLIFE GROUP

Supervisor: Tim Sutterfield or Linda Elliot IBRRC

Strategy: If significant quantities of oil are released, then implement the Wildlife Management Plan

Tactic: If significant quantities of oil are released, then send out observation and capture teams to the rookeries on Oahu. Provide required support as necessary. Coordinate with appropriate natural resource trustees.

Tactic: The Bird Stabilization Unit has been set up at an appropriate facility per the Wildlife Management Plan.

Tactic: Send a USFWS observer out on one of the skimmers to look for potentially impacted wildlife.

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions. Be considerate of the local residents, it's their back yard. A neat site is a safe site.

RESOURCES

Position	**Name**		**Equipment**
Division Supervisor		Radio	
			Bird Stabilization Unit
			Big Boom Truck or Crane
			Tractor Trailer

prepared by:

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase IV: Lift and Relocate to Shallow Water			**DRAFT**
Operational Period:	beginning	1-Sep-01	0600 hrs.	Saturday
	ending	14-Sep-01	0600 hrs.	Friday
	duration	14 days		

EQUIPMENT DECON GROUP

Supervisor:

Strategy: Generally when responding to diesel fuel oil spills there is no contamination of the vessels hulls. However, Skimmers and Booms must be cleaned prior to returning them to inventory.

Tactic: Establish a vessel decontamination area at the ESSM Facility or Pearl City Peninsula. Follow the Decontamination Plan. The vessels hulls should be wiped with "hand cleaner" to remove the oily film if necessary.

Tactic: All oil boom must be cleaned before returning it to inventory. A boom cleaning station to be set up at the ESSM Facility at Bishop Point, Pearl Harbor or at Pearl City Peninsula.

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions. Be considerate of the local residents, it's their back yard. A neat site is a safe site.

RESOURCES

Position	Name	Equipment
Division Supervisor		
Night Shift		
Supervisor		
Hand Crew		

prepared by: Rusty Nall

ICS Form 204	**DECONTAMINATION PLAN**	June 01, 2001 18:00 hrs.

Incident Name: **Ehime Maru Recovery** **DRAFT**

Operational Period:	beginning	1-Sep-01	0600 hrs	Saturday
	ending	14-Sep-01	0600 hrs	Friday
	duration	14 days		

Safety Message: All work is to be performed with consideration for Heat Stress Reduction issues. The Site Safety and Health and Medical plans must be reviewed prior to work.

VESSEL DECONTAMINATION GROUP	Supervisor:	Steve Christiansen
	USCG Rep:	As assigned.

VESSEL DECONTAMINATION

1. Oiled vessels shall be gross decontaminated at the spill site to the greatest extent possible to prevent the spread of contamination from the spill site. Gross decon shall include:
   a. Wipe down exterior hull with sorbent materials (avoid pinch-points).
   b. Wipe down contaminated equipment (on-deck) with sorbent materials.
   c. Wipe down contaminated deck areas with sorbent materials.

2. Shift vessel to Pearl Harbor Decon Staging Area (Pearl Peninsula) or Navy ESSM base at Bishop Point. Vessel shall be immediately boomed (360 degrees) with harbor boom.

3. Unload all contaminated equipment to shore for land-based decon.

4. Using a mild degreasing solution (Simple Green or similar), brush and/or wipe contaminated areas aboard vessel. NOTE: Special care shall be taken to minimize the possibility of liquids leaving the vessel's deck.

5. Rinse vessel with fresh water.

6. Using a mild degreasing solution (Simple Green or similar) on sorbent materials, wipe contaminated areas of external hull.

7. All wastes generated shall be disposed in accordance with the Disposal Plan.

EQUIPMENT DECONTAMINATION

1. Equipment shall be decontaminated within a containment using a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

2. Ocean boom shall be decontaminated using a scaffold system within containment using a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

3. All wastes generated shall be disposed in accordance with the Disposal Plan.

INCIDENT ACTION PLAN

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**

Phases V, VI: Shallow-water Crewmember Recovery

Date Plan Prepared:	June 01, 2001	Time:	18:00 hrs.	
Operational Period*:	Beginning	14-Sep-01	06:00 hrs.	Friday
	Ending	21-Oct-01	06:00 hrs.	Sunday
	Duration	37 Days		

* Subject to change based on recovery operation accomplishments

Approvals: FOSC USCG ______________________

SOSC Hawaii ______________________

US NAVY Incident Commander ______________________

This plan has been prepared in accordance with 33 CFR 136 and is consistent with the National Contingency Plan and Hawaii Area Plan for the COTP Honolulu

Table of Contents

Attached Plans

Strategic Objectives for this Operational Period

Phases V, VI: Shallow-water Crewmember Recovery

September 14 through October 21, 2001

DRAFT

1 Monitor the site for evidence of a release using a helicopter, if required.

2 Establish and maintain a Safety Zone both on the water and in the airspace above.

3 Maintain a high level of readiness at the Shallow-water Recovery Site for the first 24 hours. After the vessel stablizes, and if no oil is observed, then only one skimmer will be left on scene if required with the two other Navy skimmers on standby at the ESSM facility. The OSRV CLEAN ISLANDS on standby at Pier 34 in Honolulu Harbor.

4 Oil containment boom will be staged offshore at the Shallow-water Recovery Site. The boom will be positioned as required to contain or deflect any oil that may be released. This boom will remain off shore at the site through the phase.

Note: The Shallow-water Recovery Phase will be begin when the Crowley Maritime barge CMD 450 is moved into position, which will occur after the ROCKWATER has disconnected from the EHIME MARU.

ICS Form 202 continued

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001
18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE**			**DRAFT**
	Phases V, VI: Shallow-water Crewmember Recovery			
Operational Period:	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

HEALTH & SAFETY GROUP

Supervisor: Teal Cross

Strategies:

1) Assess and evaluate job safety standards throughout operation.

2) Update safety contingencies and procedures as required.

3) Ensure availability of emergency medical care.

4) Ensure adequate personal protective equipment is available and used.

5) Ensure air monitoring equipment is serviceable and available for use as required.

6) Develop Site-specific Spill Health & Safety Plan.

7) Conduct daily safety briefings.

RESOURCES

Position	**Equipment**
Supervisor	Gastech Multi Meter
Hazmat Technician	Sensidyne Detector Kit
Hazmat Technician	Vehicle
Hazmat Technician	
	Specialized Personal Protective Equipment
	Nomex Suits
	SCBA x 2
	3/4 Rain Gear
	Nitrile Gloves
	Rubber Boots

prepared by:

ICS Form 204	**FIELD ASSIGNMENTS**	date prepared June 01, 2001 18:00 hrs.

Incident Name:	**EHIME MARU SPILL RESPONSE** Phases V, VI: Shallow-water Crewmember Recovery			**DRAFT**
Operational Period:	beginning	14-Sep-01	0600 hrs.	Wednesday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

SECURITY GROUP

Supervisor:

Strategy: During the Shallow-water Recovery phase there will be a high level of public interest. An adequate safety zone must be maintained. Both airspace and water access must be controlled.

Tactic: The Navy will provide the security vessel for the Shallow Water Recovery Site.

Tactic: The USCG will provide periodic Security Vessel if requested.

Tactic: The FAA will establish a controlled airspace above the site.

Note: The security assignments will be finalized when the Navy Operations Orders are released.

Safety Message:

RESOURCES

Position	Name	Equipment
		NAVY Security Vessel
		USCG 41 ft. UTB

ICS Form 204	**FIELD ASSIGNMENTS**			date prepared June 01, 2001 18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phases V, VI: Shallow-water Crewmember Recovery			**DRAFT**
Operational Period:	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

SURVEILLANCE GROUP

Supervisor: N3

Strategy: Provide periodic surveillance capability of the Shallow-water Recovery site with a commercial helicopter for the first 24 hours. If no oil is observed, then with the permission of Unified Command, the overflights will be discontinued until the Deep-water Relocation Phase.

Safety Message:

RESOURCES

Position	**Name**	**Equipment**
Surveillance Spvr.		Commercial Helicopter

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**

Phases V, VI: Shallow-water Crewmember Recovery

Operational Period:				
	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

ON WATER RECOVERY GROUP

Supervisor: SUPSALV

Strategy: It is the responsibility of the On Water Recovery Group to position the US Navy SUPSALV Marco skimmers to recover any oil that may rise to the surface during the recovery operations. Continue to reassess during critical operations.

Note: The Shallow-water Recovery Phase begins when the ROCKWATER 2 has disconnected from the EHIME MARU.

Tactic: Position one of the Navy SUPSALV skimmers down wind and down current during the initial 24 hr. stabilization period of the recovery operations. In the event of a release, recover the product. Follow any instructions given by the aerial surveillance group.

Tactic: The OSRV CLEAN ISLANDS will stand by at Pier 34.

Tactic: The other two NAVY SUPSALV skimmer systems will be on standby at the ESSM facility in Pearl Harbor.

Tactic: Pre-position plenty of sorbent sweep and boom onboard the diving support barge In the eve of a release, assist in recovering the product using the sorbent material. Follow any instructions given by the aerial surveillance group.

Safety Message:

RESOURCES

Position	Name	Contact	Equipment
Supervisor			SUPSALV Skimmer 02
Boat Operators			SUPSALV Skimmer 04
Deck Hands			SUPSALV Skimmer 95
Technicians			Monarch
			Monarch
			Crew Boat
			Crew Boat
			Crew Boat
			Crew Boat
			Crew Boat
			Vacuum Recovery System
			RHIB Inflatable SUPSALV
			OSRV Clean Islands
prepared by:			Plenty of Sorbent Material

ICS Form 204	**FIELD ASSIGNMENTS**	date prepared June 01, 2001 18:00 hrs.

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**

Phases V, VI: Shallow-water Crewmember Recovery

Operational Period:				
	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

ON WATER BOOMING GROUP

Supervisor: SUPSALV

Note: The Shallow-water Recovery Phase begins when the ROCKWATER 2 has disconnected from the EHIME MARU.

Strategy: The On Water Booming Group will position the US Navy SUPSALV Ocean Boom to contain any oil that may rise to the surface during the removal operations.

Tactic: Position the one thousand feet of USN SUPSALV Ocean Boom down wind and down current of the recovery operations. In the event of a release, move the boom to contain the product. Follow any instructions given by the aerial surveillance group.

Tactic: Deploy Protection Boom in Keehi Lagoon as per the Hawaii Area Plan if required.

Tactic: There will be an additional 2,000 feet of Ocean Boom on standby at the ESSM facility in Pearl Harbor. CIC and PENCO have more than 20,000 feet of additional backup boom if required.

Safety Message:

RESOURCES

Position	Name	Contact	Equipment
Supervisor			1000 ft. of Ocean Oil Boom
Boat Operators			SUPSALV Workboat
Deck Hands			SUPSALV Workboat
Technicians			Anchoring Systems

prepared by:

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** **Phases V, VI: Shallow-water Crewmember Recovery**			**DRAFT**
Operational Period:	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

DIVISION "A" EWA BEACH

Supervisor:

Strategy: Ewa Beach is to the West of Pearl Harbor. With the prevailing weather during the Shallow-water Removal phase of the operations, if oil is released, the trajectories indicate the majority of the oil will move parallel to the shoreline and out to open ocean. However, if there is an impact, then a shoreline response will be necessary. Therefore the following tasks will be identified and done if required.

Tactic: Responders will place sorbent sweep along the shoreline to absorb any oil that may wash ashore.

Tactic: Responders will collect any oiled debris from along the shoreline.

Tactic: Establish Zone Control and set up Divisional Personnel Decon Stations. Appropriate warning signs will be posted by the State Department of Health.

Tactic (Night Shift):

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions.

RESOURCES

Position	**Name**	**Equipment**
Division Supervisor		Oil spill Response Van Flatbed Truck Sorbent Sweep

prepared by: Rusty Nall

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phases V, VI: Shallow-water Crewmember Recovery			**DRAFT**
Operational Period:	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

DISPERSANT APPLICATION GROUP

Supervisor:

CIC Dave Carter

Strategy: The FOSC must authorize the use of dispersants. This Group will only be activated if the FOSC approves use of dispersants. If dispersants are used, a *DISPERSANT PLAN w*ill be developed, coordinated with the Natural Resources trustees and then implemented.

Tactic: The Dispersant Application Bucket System will be on standby at the Clean Islands Council warehouse during the Lift and Transit operations.

Note: No dispersant application at night.

Safety Message:

RESOURCES

Position	Name	Equipment
		Dispersant Helicopter
		Spotter Helicopter
		Observer Helicopter
		Dispersant Bucket No. 1
		Dispersant Bucket No. 2
		Dispersant Trailer

ICS Form 204	**FIELD ASSIGNMENTS**	date prepared June 01, 2001 18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phases V, VI: Shallow-water Crewmember Recovery			**DRAFT**
Operational Period:	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

WILDLIFE GROUP

Supervisor: Tim Sutterfield or Linda Elliot IBRRC

Strategy: If significant quantities of oil are released, then implement the Wildlife Management Plan

Tactic: If significant quantities of oil are released, then send out observation and capture teams to the rookeries on Oahu. Provide required support as necessary. Coordinate with appropriate natural resource trustees

Tactic: The Bird Stabilization Unit has been set up at an appropriate facility per the Wildlife Management Plan.

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions. Be considerate of the local residents, it's their back yard. A neat site is a safe site.

RESOURCES

Position	Name	Equipment
		Bird Stabilization Unit
		Big Boom Truck or Crane
		Tractor Trailer

prepared by:

ICS Form 204	FIELD ASSIGNMENTS	date prepared April 28, 2001 18:00 hrs.

Incident Name:	**EHIME MARU SPILL RESPONSE** Lift and Relocate to Shallow Water			**DRAFT**
Operational Period:	beginning	14-Sep-01	0600 hrs.	Friday
	ending	21-Oct-01	0600 hrs.	Sunday
	duration	37 Days		

EQUIPMENT DECON GROUP

Supervisor:

Strategy: Generally when responding to diesel fuel oil spills there is no contamination of the vessels hulls. However, Skimmers and Booms must be cleaned prior to returning them to inventory.

Tactic: Establish a vessel decontamination area at the ESSM Facility. The vessels hulls should be wiped with "hand cleaner" to remove the oily film if necessary.

Tactic: All oil boom must be cleaned before returning it to inventory. A boom cleaning station must be set up at the ESSM Facility at Bishop Point, Pearl Harbor.

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions. Be considerate of the local residents, it's their back yard. A neat site is a safe site.

RESOURCES

Position	Name	Equipment

prepared by: Rusty Nall

ICS Form 204 **DECONTAMINATION PLAN** June 01, 2001
18:00 hrs.

Incident Name:	**Ehime Maru Recovery**			**DRAFT**
Operational Period:	beginning	14-Sep-01	0600 hrs	Friday
	ending	21-Oct-01	0600 hrs	Sunday
	duration	37 Days		

Safety Message: All work is to be performed with consideration for Heat Stress Reduction issues. The Site Safety and Health and Medical plans must be reviewed prior to work.

VESSEL DECONTAMINATION GROUP

Supervisor: Steve Christiansen
USCG Rep: As assigned.

VESSEL DECONTAMINATION

1. Oiled vessels shall be gross decontaminated at the spill site to the greatest extent possible to prevent the spread of contamination from the spill site. Gross decon shall include:
   a. Wipe down exterior hull with sorbent materials (avoid pinch-points).
   b. Wipe down contaminated equipment (on-deck) with sorbent materials.
   c. Wipe down contaminated deck areas with sorbent materials.

2. Shift vessel to Pearl Harbor Decon Staging Area (Pearl Peninsula) or Navy ESSM base at Bishop Point. Vessel shall be immediately boomed (360 degrees) with harbor boom.

3. Unload all contaminated equipment to shore for land-based decon.

4. Using a mild degreasing solution (Simple Green or similar), brush and/or wipe contaminated areas aboard vessel. NOTE: Special care shall be taken to minimize the possibility of liquids leaving the vessel's deck.

5. Rinse vessel with fresh water.

6. Using a mild degreasing solution (Simple Green or similar) on sorbent materials, wipe contaminated areas of external hull.

7. All wastes generated shall be disposed in accordance with the Disposal Plan.

EQUIPMENT DECONTAMINATION

1. Equipment shall be decontaminated within a containment using a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

2. Ocean boom shall be decontaminated using a scaffold system within containment using a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

3. All wastes generated shall be disposed in accordance with the Disposal Plan.

INCIDENT ACTION PLAN

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**
Phase VII, Deep-water Relocation

Date Plan Prepared:	June 01, 2001	Time:	18:00 hrs.	
Operational Period*:	Beginning	21-Oct-01	06:00 hrs.	Sunday
	Ending	30-Oct-01	06:00 hrs.	Tuesday
	Duration	14 days		

* Subject to change based on recovery operation accomplishments

Approvals: FOSC USCG ______________________________

SOSC Hawaii ______________________________

US NAVY Incident Commander ______________________________

This plan has been prepared in accordance with 33 CFR 136 and is consistent with the National Contingency Plan and Hawaii Area Plan for the COTP Honolulu

Table of Contents

Attached Plans

Strategic Objectives for this Operational Period

Phase VII, Deep-water Relocation

October 21 through October 30, 2001

DRAFT

1 Monitor the site for evidence of a release using periodic helicopter overflights.

2 One NAVY skimming system will remain on standby to follow the Crowley Maritime Barge CMC 450-10 to the Deep-water Relocation Site if oil is observed.

3 Establish and maintain a Safety Zone both on the water and in the airspace above.

Note: The Deep Water Relocation Phase will be begin when the Crowley Maritime barge CMD 450 has lifted the EHIME MARU off the seafloor.

ICS Form 202 continued

ICS Form 204	**FIELD ASSIGNMENTS**	date prepared June 01, 2001 18:00 hrs.

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**

Phase VII, Deep-water Relocation

Operational Period:				
	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

HEALTH & SAFETY GROUP

Supervisor: Teal Cross

Strategies:

1) Assess and evaluate job safety standards throughout operation.

2) Update safety contingencies and procedures as required.

3) Ensure availability of emergency medical care.

4) Ensure adequate personal protective equipment is available and used.

5) Ensure air monitoring equipment is serviceable and available for use as required.

6) Develop Site-specific Spill Health & Safety Plan.

7) Conduct daily safety briefings.

RESOURCES

Position	**Equipment**
Supervisor	Gastech Multi Meter
Hazmat Technician	Sensidyne Detector Kit
Hazmat Technician	Vehicle
Hazmat Technician	
	Specialized Personal Protective Equipmen
	Nomex Suits
	SCBA x 2
	3/4 Rain Gear
	Nitrile Gloves
	Rubber Boots

prepared by:

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** 1-Jun-01

18:00 hrs.

Incident Name:	**EHIME MARU SPILL RESPONSE** Phase VII, Deep-water Relocation			**DRAFT**
Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

SECURITY GROUP

Supervisor:

Strategy: During the Deep-water Relocation phase it is not anticipated that security vessels will need to be on site. However, there will be operational requirements for moving Safety Zones to be established. If there is a need, then a USCG Vessel will be dispatched to enforce the moving Safety Zone.

Tactic: The USCG will provide an escort vessel if requested.

Note: The security assignments will be finalized when the NAVY Operations Orders are released.

Safety Message:

RESOURCES

Position	**Name**	**Equipment**
		USCG 41 ft. UTB

ICS Form 204	FIELD ASSIGNMENTS		date prepared June 01, 2001 18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase VII, Deep-water Relocation			**DRAFT**
Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

SURVEILLANCE GROUP

Supervisor: USN Rep (N3)

Strategy:

Tactic: Periodic overflights will be conducted throughout the transit of EHIME MARU from the Shallow-water Recovery Site to the Deep-water Relocation site, as necessary.

Safety Message:

RESOURCES

Position	Name	Equipment
Air Support Spvr.	N3	Commercial Helicopter

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**

Phase VII, Deep-water Relocation

Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

ON WATER RECOVERY GROUP

Supervisor: SUPSALV

Strategy: All of the oil that could safely be removed from the EHIME MARU has been recovered. It is anticipated that a minimal amount of oil may remain, therefore a skimming capability will be able to rapidly respond should any oil be released during the Deep-water Relocation Phase.

Tactic: One NAVY SUPSALV Marco Skimmer will be on standby at the ESSM Base, Bishop Point Pearl Harbor during this phase. In the unlikey event that any oil is released, the Navy skimmer will respond to recover to the maximum extent possible any oil that may rise to the surface. The NAVY skimmer system will continue as long as weather conditions will safely permit.

Tactic: The OSRV CLEAN ISLANDS will be on standby at its base at Pier 34, Honolulu Harbor

Safety Message:

RESOURCES

Position	Name	Contact	Equipment
Supervisor			SUPSALV Skimmer 02
Boat Operators			Monarch
Deck Hands			Monarch
Technicians			RHIB Inflatable SUPSALV

prepared by: Sufficient Sorbent Material

date prepared

ICS Form 204 **FIELD ASSIGNMENTS** June 01, 2001

18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase VII, Deep-water Relocation			**DRAFT**
Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

ON WATER BOOMING GROUP

Supervisor: SUPSALV

Strategy: To the maximum extent practicable, any residual oil and hazardous materials remaining on Ehime Maru will have been removed and vessel sealed by Navy Divers at the Shallow-water Recovery Site. There is very little likelihood of a spill occurring during this phase.

Tactic: This Group is on standby

Tactic:

Tactic:

Safety Message:

RESOURCES

Position	Name	Contact	Equipment
Supervisor			1000 ft. of Ocean Oil Boom
Boat Operators			SUPSALV Workboat
Deck Hands			SUPSALV Workboat
Technicians			Anchoring Systems

prepared by:

ICS Form 204	**FIELD ASSIGNMENTS**			June 01, 2001 18:00 hrs.
Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase VII, Deep-water Relocation			**DRAFT**
Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

DIVISION "A" EWA BEACH

Supervisor:

Strategy: Ewa Beach is to the West of Pearl Harbor. With the prevailing weather during the Shallow-water Removal phase of the operations, if oil is released the trajectories indicate the majority of the oil will move parallel to the shoreline and out to open ocean. However, if there is an impact, then shoreline response will be necessary. Therefore, the following tactics will be identified and done if required.

Tactic: Responders will place sorbent sweep along the shoreline to adsorb any oil that may wash ashore.

Tactic: Responders will collect any oiled debris from along the shoreline.

Tactic: Establish Zone Control and set up Divisional Personnel Decon Stations.

Task (Night Shift):

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions.

RESOURCES

Position	Name	Equipment
Division Supervisor		Oil spill Response Van Flatbed Truck Plenty of Sorbent Sweep and Boom

prepared by: Rusty Nall

ICS Form 204	**FIELD ASSIGNMENTS**	date prepared June 01, 2001 18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase VII, Deep-water Relocation			**DRAFT**
Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

DISPERSANT APPLICATION GROUP

Supervisor:

CIC Dave Carter

Strategy: The FOSC must authorize the use of dispersants. This Group will only be activated if the FOSC approves use of dispersants. If dispersants are used, a *DISPERSANT PLAN* will be developed, coordinated with the Natural Resources trustees and then implemented.

Tactic: The Dispersant Application Bucket System will be on standby at the Clean Islands Council warehouse during the Lift and Transit operations.

Note: No dispersant application at night.

Safety Message:

RESOURCES

Position	Name	Equipment
Supervisor		Dispersant Helicopter Spotter Helicopter Observer Helicopter Dispersant Bucket No. 1 Dispersant Bucket No. 2 Dispersant Support Trailer

date prepared

ICS Form 204

FIELD ASSIGNMENTS

June 01, 2001
18:00 hrs.

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** Phase VII, Deep-water Relocation			**DRAFT**
Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

WILDLIFE GROUP

Supervisor:

Strategy: If significant quantities of oil are released, then implement the Wildlife Management Plan

Tactic: If significant quantities of oil are released, then send out observation and capture teams to the rookeries on Oahu. Provide required support as necessary. Coordinate with appropriate natural resource trustees.

Tactic: The Bird Stabilization Unit has been set up at an appropriate facility per the Wildlife Management Plan.

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions. Be considerate of the local residents, it's their back yard. A neat site is a safe site.

RESOURCES

Position	Name	Equipment
		Bird Stabilization Unit
		Big Boom Truck or Crane
		Tractor Trailer

prepared by: Rusty Nall

ICS Form 204	**FIELD ASSIGNMENTS**	date prepared April 28, 2001 18:00 hrs.

Incident Name: **EHIME MARU SPILL RESPONSE** **DRAFT**

Phase VII, Deep-water Relocation

Operational Period:	beginning	21-Oct-01	0600 hrs.	Sunday
	ending	30-Oct-01	0600 hrs.	Tuesday
	duration	14 days		

EQUIPMENT DECON GROUP

Supervisor:

Strategy: Generally when responding to diesel fuel oil spills there is no contamination of the vessels' hulls. However, skimmers and booms must be cleaned prior to returning them to inventory. Although the majority of the oil has been removed from the EHIME MARU, if any vessels are oiled during the Deep-water Relocation phase.

Tactic: Establish a vessel decontamination area at the ESSM Facility. The vessels hulls should be wiped with "hand cleaner" to remove the oily film if necessary.

Tactic: All oil boom must be cleaned before returning it to inventory. A boom cleaning station must be set up at the ESSM Facility at Bishop Point, Pearl Harbor.

Tactic:

Tactic:

Safety Message: Use the required PPE. Be sure to set up proper Personnel Decon Stations and minimize cross contamination. Be aware of heat stress conditions. Be considerate of the local residents, it's their back yard. A neat site is a safe site.

RESOURCES

Position	**Name**	**Equipment**	
Division Supervisor		Vehicle	Radio
PENCO Supervisor		Pick Up Truck	
Vac Truck Operator		Vac Truck	Skim Pak
Vac Truck Operator		Vac Truck	Skim Pak
		Flatbed Truck	
Hand Crew			
Total Day Personnel			
Night Shift			
Supervisor			
Hand Crew			

prepared by: Rusty Nall

ICS Form 204	DECONTAMINATION PLAN	June 01, 2001 18:00 hrs.

Incident Name:	**Ehime Maru Recovery**			**DRAFT**
Operational Period:	beginning	21-Oct-01	0600 hrs	Sunday
	ending	30-Oct-01	0600 hrs	Tuesday
	duration	14 days		

Safety Message: All work is to be performed with consideration for Heat Stress Reduction issues. The Site Safety and Health and Medical plans must be reviewed prior to work.

VESSEL DECONTAMINATION GROUP

Supervisor: Steve Christiansen
USCG Rep: As assigned.

VESSEL DECONTAMINATION

1. Oiled vessels shall be gross decontaminated at the spill site to the greatest extent possible to prevent the spread of contamination from the spill site. Gross decon shall include:
   a. Wipe down exterior hull with sorbent materials (avoid pinch-points).
   b. Wipe down contaminated equipment (on-deck) with sorbent materials.
   c. Wipe down contaminated deck areas with sorbent materials.

2. Shift vessel to Pearl Harbor Decon Staging Area (Pearl Peninsula) or Navy ESSM base at Bishop Point. Vessel shall be immediately boomed (360 degrees) with harbor boom.

3. Unload all contaminated equipment to shore for land-based decon.

4. Using a mild degreasing solution (Simple Green or similar), brush and/or wipe contaminated areas aboard vessel. NOTE: Special care shall be taken to minimize the possibility of liquids leaving the vessel's deck.

5. Rinse vessel with fresh water.

6. Using a mild degreasing solution (Simple Green or similar) on sorbent materials, wipe contaminated areas of external hull.

7. All wastes generated shall be disposed in accordance with the Disposal Plan.

EQUIPMENT DECONTAMINATION

1. Equipment shall be decontaminated within a containment using a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

2. Ocean boom shall be decontaminated using a scaffold system within containment using a mild degreasing solution (Simple Green or similar), followed by a fresh water rinse within the containment.

3. All wastes generated shall be disposed in accordance with the Disposal Plan.

Site Safety and Health Plan

Incident Name: Ehime Maru Recovery	Operational Period*
Location: South shore of Oahu	From: Date: 1-Aug-01 Time: 06:30 hrs
Group/Division	To: Date: 30-Oct-01 Time: 06:30 hrs

This is a ☒ New Plan ☐ Revised Plan

On-Scene Commander

Name	*company/organization*	*phone/radio*	*operational area*
RADM Klemm	CINCPACFLT		

Site Safety Officer

Name	*company/organization*	*phone/radio*	*operational area*
Teal Cross	PENCO - USN Contractor	808-545-5195	Field Operations

Site Operating Companies

Company name	*Field supervisor*	*phone/radio*	*operational area*
Jimmy Johnson	U.S. Navy SUPSALV	808 284-9930	Offshore Recovery Site
Captain Tim Sawyer	Clean Islands Council	808 536-5814	Offshore Recovery Site

Description of Site
Initially, open ocean offshore of the island of Oahu.
Ultimately, the recovery location will be nearshore along the coastline of Oahu.

Locations of Site
Approximately nine miles south east of Oahu. Transiting to the southern nearshore area off of Oahu.

Description of Surrounding Area
Open ocean moving to nearshore coastline of Oahu.
The nearshore area is offshore of the Honolulu International Airport.

Description of Surrounding Population
The Honolulu International Airport is an industrial area. Slightly east of this location is the coastal protected waters of Keehi Lagoon, which has recreational and wildlife sensitivities.

Health and PPE Requirement *(matrix on reverse side)*

☒ Outer Gloves	☐ Face Shield	☒ Site Characterization	☒ Prework Medical	☒ Zone Control
☐ Inner Gloves	☒ Sun Hat	☐ Air Purifying Resp.	☐ 40 Hr. HAZWOPER	☒ Security
☐ Rubber Boots	☒ Sun tan Lotion	☐ Supplied Air Resp.	☒ 24 Hr. HAZWOPER	☐ C/S Ent. Permit
☐ 2/3 Body Cover	☐ Taped Leg Joints	☒ Safety Glasses	☒ First Aid Station	☒ Personnel Decon
☐ Full Body Cover	☒ Hard Hat (Overhead Haz Areas)	☒ Heat Stress Program	☒ Shade Station	☒ USCG Life Vest

Personal Protective Equipment and Heat Stress

Besides training and development of a Site Safety and Health Plan, appropriate selection and wear of Personal Protective Equipment (PPE) is essential for worker safety. The following matrix is provided to assist the Site Safety Supervisor in using his hazard analysis to determine appropriate PPE and work procedures. No attempt is made to address respiratory protection; normally oil spills do not require use of a respirator

PPE Decision Matrix	Shoreline								Vessel						
Key: R -- Required S -- Suggested	Sun Exposure	HI Heat Stress > 85	HI Heat Stress > 90	Non Splashing Oil	Splashing Oil	LO Energy Surf Zone	HI Energy Surf Zone	Crane / Rigging Work	Sun Exposure	HI Heat Stress > 85	HI Heat Stress > 90	Non Splashing Oil	Splashing Oil	Working on Vessel	Crane/Rigging Work
High Gauntlet Gloves				R	R		R	R				R	R		
Inner Gloves				S	S		S	S				S	S		
Sun Hat	R			R	R		R		R			R	R		
Sun Screen	R			R	R		R	R	R			R	R		
Sun Glasses	S			S	S		S	S	S			S	S		
Rubber Boots				R	R		R	R				R	R		
Saranex/Vinyl Coverall Bottom				R	R		R	R				R	R		
Saranex / Vinyl Jacket					R								R		
Steel Toe Shoes								R							R
Goggles or Face Shield					R								R		
Work Vest Type Pfd						R		R				R	R	R	R
Hard Hat								R							R
2/3's PPE Coverage		S	S	S						S	S	S			
Staggered Work Shifts		S	R							S	R				
Shade Stations		R	R	S						R	R	S			
Personal Water Bottles		S	R							S	R				
Cooling Vests			S								S				

Operational Objectives

Safety of workers and public.

Site Control

Site Control Description

Site control offshore will consist of vessel safety and area exclusion policies in the event of a a release.

In the event of a shoreline impact the proper zone control will be established as required to prevent cross contamination and public exposure.

Site Control Map (Reference Sketch)

To be developed in the event of a shoreline impact.

Site Security

Requirements

Field response personnel will be required to have 24 hours of HAZWOPER training.

All site workers shall be briefed on the contents of this Safety Plan.

Site Characterization and Monitoring

Exposure Potential:

Diesel fuel and lube oils

Required Characterization Testing:

Initial and periodic testing for total hydrocarbons, benzene, LEL. will be conducted in the event of a release. This will continue until there is no threat of exposure.

Exposure Limits:

Benzene - 0.5 ppm, LEL - 10% of .6% is .06%, Total Hydrocarbon 300 ppm.

Required Monitoring:

In the event of a shoreline impact initial and periodic on-shore, on-water and under piers if visible hydrocarbons are present.

Field Site Characterization Checklist

Date:	Time:

Location:

Offshore Work Site
Offshore of Honolulu International Airport, Oahu, Hawaii

Type of Petroleum Involved:

Diesel fuel with the possibility of lube oils.

Personal Protection Equipment

[x] Outer Gloves	[ ] Face Shield	[x] Site Characterization	[x] Prework Medical	[x] Zone Control
[ ] Inner Gloves	[x] Sun Hat	[ ] Air Purifying Resp.	[ ] 40 Hr. HAZWOPER	[x] Security
[ ] Rubber Boots	[x] Sun tan Lotion	[ ] Supplied Air Resp.	[x] 24 Hr. HAZWOPER	[ ] C/S Ent. Permit
[ ] 2/3 Body Cover	[ ] Taped Leg Joints	[x] Safety Glasses	[x] First Aid Station	[x] Personnel Decon
[ ] Full Body Cover	[x] Hard Hat	[x] Heat Stress Program	[x] Shade Station	[x] USCG Life Vest

Monitoring Equipment

Industrial Scientific TMX -412 (O2/LEL/), Draeger CMS System (Total Hydrocarbons, Benzene)

Lower Exposure Limit (LEL)

10% of 0.6% is 0.06%

LEL = 0.06%

Hydrogen Sulfide (H2S)

None expected

H_2S = 10 ppm

Benzene (TBX)

PPM = 0.5 ppm

Near Site Emergency Response resources

When a person is injured, the Site Safety Officer or other qualified personnel must ...

Notify Site Safety Officer of all injuries. Describe injury, location where injury occurred
If transported - How transported (vessel or helicopter and the landing site and hospital transported to) The Captains of the primary vessels will act as on-water safety officers. The OSRV Clean Islands will act as Safety Officer for the smaller offshore support vessels in the event of a response.

Standard Procedures for Reporting Emergencies

When calling for assistance in an emergency, provide the following information ...

Location of emergency, description of emergency (e.g. medical, fire)

Ambulance

See medical plan

Water taxis of other available small craft will be used for transporting injured personnel from offshore to nearest location either Pier 14 or the small vessel launch ramp facility located adjacent to the Honolulu Community College Marine Training Center on Sand Island just inside Keehi Lagoon.

Fire Department

911 - City and County of Honolulu Fire Dispatch

471-7117 - Naval Base Pearl Harbor Emergency Dispatch

Oil Spill Response

Oil spill response will be conducted under a ICS/Unified Command management team operating from the Hawaii Oil Spill Response Center.

Hospital / Emergency Medical

See attached medical plan

Hazard Reduction Procedures

Slipping hazard - non skid boots (oil resistant soles)

Where splashing of fuel is likely full saranex or PVC suits must be worn

On-water/near-water - wear PFD

Heat Stress - See heat stress plan

Thermal Stress Reduction Program

Operational Requirements:

Offshore it is not expected that heat stress will be of great concern for normal work activities. In the event of a release and the need for PPE heat stress reduction efforts will be initiated. Supervisory personnel shall monitor workers for signs and symptoms of heat stress.

Rehab stations with liquids to hydrate. Electrolyte drinks perferred.
In the event of shoreline impact, shade tents and cold water to be provided at all Division rest stations. Cold water is to be provided on all work vessels. Supervisors are to monitor workers for heat stress and ensure all workers are drinking adequate amounts of water.
First Aid Station personnel to monitor workers for signs and symptoms of heat stress.
Two thirds PPE is mandatory except in the event of splashing or dripping oil.
In the event dispersants are used see the special conditions of the Dispersant Site Safety Plan.

Contacts List

Important numbers:

See Medical Plan for Emergency Numbers or call 911 Police/Fire/EMS (off base) or 471-7117 (on base Pearl Harbor)

Notification and Distribution

Who should receive a copy of this plan:

IC,all Command Staff, Operations, Logistics, Planning, Finance
Safety
All vessels and All Divisions: A, B, C,D, E
All Decon Stations
Field Ops

Plan Approvals

Plan Prepared by Kim Beasley, Clean Islands Council	*Date*
Navy Incident Commander Rear Admiral Klemm, Commander in Chief, U.S. Pacific Fleet	*Date*
U.S. Coast Guard's Representative Capt. Kanazawa, Federal On-Scene Coordinator	*Date*
State of Hawaii's Representative Curtis Martin	*Date*

ICS Form 206 | Incident Name | date prepared 17-May-01

MEDICAL PLAN **EHIME MARU OIL SPILL RESPONSE**

MEDICAL AID STATIONS	LOCATION	Paramedics YES	NO
Division A	As activated		x
Division B	As activated		x
Division C	As activated		x
Nearshore Containment Group	As activated		x

A minimum of two CPR-First Aid-qualified persons shall be on site during all work activities to handle minor injuries and basic first aid care.

Refer to Navy Diving and Salvage Operations Plan for all medical emergencies involving diving operations.

This Medical Plan shall also provide options for medical attention beyond the capabilities of on site first aid as follows:

OFFSHORE TRANSPORTATION

The USCG Search and Rescue Center shall be notified for emergency offshore transportation via helicopter for injuries requiring immediate-emergency medical attention (urgent care required) for transportation to the appropriate medical facility (below). Phone: 1-800-552-6458

An on-site water taxi, tug (or other suitable vessel) may be utilized to transport injured personnel (non-urgent, serious injuries) to Honolulu Harbor. A pier shall be designated as a rendezvous point with a land-based ambulance at the time of transportat

NEARSHORE TRANSPORTATION (Outside of Honolulu International Airport)

On Site

A small craft will be readily available at all times on the job site to transport injured personnel (any medical situation beyond the capabilities of on-site basic first aid) to rendezvous with a land-based ambulance at the Keehi Small Boat Harbor launch ramp, unless otherwise identified. This ambulance shall provide patient transportation to the appropriate medical facility (below). For on-base Pearl Harbor ambulances call 471-7117. For off base ambulances, call 911.

SEE ATTACHED SKETCH FOR THE LOCATION
OF NEARBY EMERGENCY FACILITIES

MEDICAL FACILITIES

Queens Medical Center	1301 Punchbowl Street Honolulu, Hawaii	547-4311	24-Hr Civilian Trauma Center
Tripler Army Medical Center	1 Jarrett White Road Honolulu, Hawaii 96859-5000	433-6629	24-Hr Military Emergency Medical Care
Kuakini Hospital Emergency	347 North Kuakini Street Honolulu, Hawaii	547-9540	24-Hr Civilian Emergency Medical Care
Concentra Medical Center	545 Ohohia Street Honolulu, Hawaii	831-3000	Civilian Occupational Injury Mon-Fri 7:00 am to 5:00 pm

MEDICAL EMERGENCY PROCEDURES

When calling for assistance in an emergency, the following information should be readily available:
--Your Name and Location
--Telephone number at your location
--Type of exposure or injury
--Name of person(s) exposed or injured
--Actions already taken

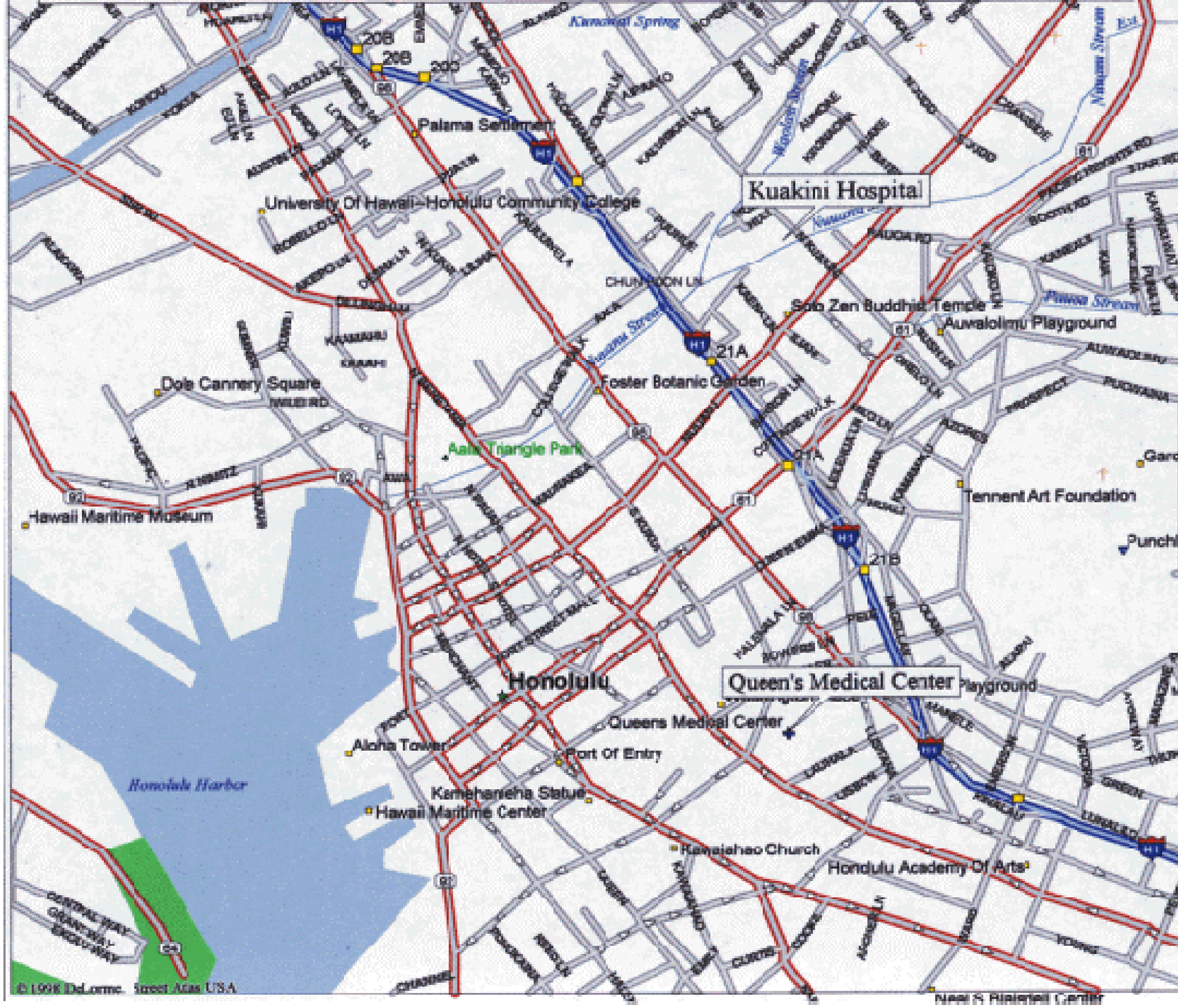
Minor injuries shall be treated on site (Basic First Aid)

For slightly more serious injuries, but the injured person is conscious and able to walk by himself, they may be driven to the nearest medical center by another worker for medical assistence.

For any significant injuries such a broken arm, a cut requiring several stiches, or anything more serious, call 471-7117 (on base Pearl Harbor ambulances) or 911 (off base ambulances) to arrange an ambulance rendezvous for medical attention at the appropriate medical facility (above). Emergency Medical Technicians from the ambulance shall identify the appropriate medical facility.

Report all injuries to the Safety Officer and Field Operations Division or Group Surpervisors

Honolulu Harbor Emergency Rooms



Queen's Medical Center
Phone: 547-4311
1301 Punchbowl St.
Honolulu, Hawaii

Kuakini Hospital
Phone: 547-9540
347 North Kuakini St.
Honolulu, Hawaii

Letter of Request

To: Federal On-Scene Coordinator
State On-Scene Coordinator

Fm: United States Navy

Subj: APPROVAL OF DECANTING DURING THE RELOCATION OF THE EHIME MARU

1. Situation: Consideration is currently being given to relocating the F/V Ehime Maru to shallow waters Oahu. There is a potential for some release of oil from the wrecked vessel. Preparations are being made to have a response posture in readiness in the event oil recovery is required. In such an event, it is reasonable to anticipate that a high percentage of water versus oil would be recovered. To maximize our offshore storage capacity as well as encourage aggressive recovery of free-floating oils, we request permission to decant in accordance with Section 3000 of the Hawaiian Area Contingency Plan.

2. The following stipulated criteria would be met.

    a. All decanting will be done offshore in the designated "response area" directly in front of the OSRV collection system.

    b. Visual monitoring of the decanting process will be maintained throughout the decanting process. An immediate ability to stop the process is in place.

3. We are asking the approval of Unified Command to decant under the described circumstances in accordance with the Hawaiian Area Contingency Plan and in a manner described above.

____
Federal On Scene Coordinator

____
State On Scene Coordinator

Oiled Wildlife Management Plan

23-May-01

Incident Name: **EHIME MARU OIL SPILL RESPONSE** **DRAFT**
All Phases

Originating Section: Planning - Environmental

Operational Period:				
	Beginning	1-Aug-01	06:00	Wednesday
	Ending	31-Oct-01	06:00	Wednesday
	Duration	90 days		

Safety Message: When handling wildlife, adequate arm and eye protection is required. Follow all applicable OSHA standards when establishing utilities to any facilities. Maintain proper construction safety practices during construction activities.

Branch: Wildlife

Supervisor: Tim Sutterfield/Steve Smith
USCG Rep:

Strategy: Be prepared to respond/manage/coordinate any oiled wildlife that may occur in association with any oil released from the Ehime Maru Recovery operations.

Tactic: Identify the resources required and available to respond to an oiled wildlife incident.

Tactic: Develop the 204's to be initiated in response to an oiled wildlife incident.

Tactic: Coordinate collection of bird feathers, fur, etc from wildlife for oil fingerprinting by USCG, if oiled wildife are observed in area and observed to encounter any oil

RESOURCES

Position	Name	Organization
Wildlife Branch Manager	Tim Sutterfield/Steve Smith	U.S. Navy
State of Hawaii Wildlife Response Manager and DVM	Dr. Greg Massey	State of Hawaii DOFAW
IBRRC Hawaii Manager	Ms Linda Elliott	IBRRC

prepared by: Signature:

Report all oiled, injured or dead wildlife to the Wildlife Branch Director. **DRAFT**

RESPONSE ELEMENTS

In the event oiled wildlife response is necessary, the management program includes the six basic response elements. They are:

1 Sightings and Notification
2 Search, Capture and Collection
3 Stabilization
4 Removing the Oil - Cleaning and Drying
5 Rehabilitation
6 Wildlife Release Protocol

These steps apply generally, however, species specific characteristics may increase or decrease the importance of individual procedures. Species of significance include, but are NOT limited to threatened and endangered birds, marine mammals and sea turtles. Offshore species include marine mammals and migratory birds.

Although the response program will include the six basic elements of oiled wildlife response. The initial activities will include search and capture teams to look for oiled wildlife in the event of a release.

1. SIGHTINGS AND NOTIFICATIONS

All sighting of impacted wildlife are to be reported immediately to the Wildlife Branch Director. (See Communications Plan (ICS 205) within the project Incident Action Plan). The Wildlife Branch Director will follow up and be responsible for notification to the appropriate federal and state natural resource trustees.

a. Dead Animals

Any dead animals in the spill and adjacent sites should be reported in the same way as impacted live animals as listed above. All carcasses collected should be labeled with the time, location, person collecting and the chain-of-custody form will accompany each dead animal. (See attached form)

Bird carcasses should be placed in paper bags or wrapped completely in aluminum foil, then covered with a plastic bag and placed on ice or in a refrigerated container until a necropsy can be performed by a qualified and trustee approved specialist.

Large turtle or marine mammal carcasses should be secured and remain *in situ* until a Resource Trustee collects the appropriate diagnostic samples and takes charge of the remains.

Animals will be necropsied by qualified and natural resource trustee approved specialists in order to determine the cause of death. Custody of dead animals will be relinquished to Resource Trustees (USF&W, State, HI DLNR, NOAA) as required. The Hawaii Oil Spill Response Center has an approved evidence storage unit.

Dead oiled wildlife should be given due priority to insure they are properly recovered in a timely manner to prevent other wildlife from feeding on the body. Preferably the body will be stored/transported in a chilled container such as an styrofoam cooler with ice.

2. SEARCH AND CAPTURE

DRAFT

A Capture and Retrieval Group with multiple teams will be initiated after notification of an oil release impacting wildlife. These teams will work to locate impacted wildlife and attempt to recover oiled wildlife for care. Observations will be made at the spill site, and as appropriate, at known population and nesting sites. If oiled wildlife is discovered and determined to be a result of any oil released from the Ehime Maru Recovery operation, more remote survey, capture and retrieval efforts may be undertaken. Observation at the recovery sites will determine whether additional observations will be required at known population and nesting sites.

Search and capture of oiled wildlife should only be done by trained personnel and in coordination with natural resource trustees per the Hawaiian Area Contingency Plan. For planning purposes, search and collection teams should each have 2 personnel (I.e. one IBRRS rep and one trustee).

If deemed appropriate after consultation with federal and state natural resource trustees, hazing techniques may be used to discourage animals from entering the oil release area. A hazing equipment use agreement has been established with the U.S. Dept of Agriculture, Wildlife Services Department that can be utilized through Clean Islands Council.

a. Oiled Birds

Search and capture of oiled birds must be done by permitted and trained personnel or the appropriate natural resource trustees.

* US Fish and Wildlife Service Contacts: Don Palawski, Kevin Foster or Beth Flint (808) 541-2749.
* Hawaii Department of Land and Natural Resources Oiled Wildlife Coordinator: Dr. Greg Massey, 808-572-3502.

Guidance for oiled bird collection, stabilization and transport is provided in Attachment 4.

b. Marine Mammals and Sea Turtles

Search and capture of marine mammals and sea turtles must be done by authorized and trained personnel or the appropriate natural resource trustees.

* NOAA - National Marine Fisheries Service Contacts: Margaret Dupree, John Henderson Bradley Ryon at (808) 973-2953, ext 210 or 973-2937 or 753-0341.
* Hawaii Department of Land & Natural Resources Aquatic Resources Division: Francis Oishi, 808-587-0094.

3. STABILIZATION

Stabilization facilities will be in accordance with the Hawaiian Area Plan and is usually established on a case by case basis and in coordination with the appropriate federal and state natural resource trustees. Requirements for an oiled bird stabilization facility are given in the Hawaiian Area Contingency Plan under the heading of "Primary Care Facility."

a. Oiled Birds

In this case, there is a potential for a release, the CIC oiled bird stabilization trailer will be available should oiled birds be identified as a result of the Ehime Maru recovery operation. A plan of the stabilization

DRAFT

unit is attached. If oiled birds are detected, a stabilization facility will immediately become operational and available to service affected wildlife for the first 24-48 hours after capture.

* For oiled birds discovered at the nesting sites at and around Marine Corps Base Kaneohe, a possible location for the stabilization module is at the MCBH- Kaneohe Bay, Environmental Office Base Yard.
* Other possible locations for the stabilization facility within the Pearl Harbor Naval Complex will be identified in coordination with IBRRC.

b. Marine Mammals and Sea Turtles

In the event marine mammals and or sea turtles are oiled, all capture, stabilization, and rehabilitation action shall be done in consultation with the appropriate natural resource trustees (identified under 2. Stabilization) Although the Hawaii Area Contingency Plan has limited guidance on stabilization and rehabilitation procedures, facilities or equipment/supply support needs, it does identify availability of NOAA-NMFS tanks at Kewalo Basin, Oahu. In addition, IBRRC has access to technical experts for stabilization and rehabilitation of marine mammals and sea turtles.

4 & 5. CLEANING AND REHABILITATION

Cleaning and rehabilitation activities will be in accordance with the Hawaiian Contingency Area Plan. The scale & type of facility will be developed on a species-specific, case by case basis. Facility requirements vary based on the numbers and the species of oiled wildlife discovered. Cleaning and rehabilitation facilities should be operational and available to service collected oiled wildlife from 24-48 hours after capture. When established, the cleaning and rehabilitation facility will operate under the direction the Wildlife Branch Director in coordination with IBRRC and the appropriate involved federal and state natural resource trustees.

a. Oiled Birds

In the event that oiled birds are found, they should be brought to the Stabilization Facility. Further, development of a cleaning capability and rehabilitation facilities may also need to be stood up.

* For oiled birds discovered at the nesting sites at and around Marine Corps Base Kaneohe, possible location for the stabilization module is at the MCBH- Kaneohe Bay, Environmental Office Base Yard.
* Other possible locations for cleaning and rehabilitation facilities within the Pearl Harbor Naval Complex will be identified based on input from USFWS and HI DLNR Wildlife Coordinator.

b. Marine Mammals and Sea Turtles

In the event marine mammals and or sea turtles are oiled, all capture, stabilization and rehabilitation action shall be done in consultation with the appropriate natural resource trustees (identified under 2. Stabilization) Although the Hawaiian Area Contingency Plan has limited guidance on stabilization and rehabilitation procedures, facilities or equipment/supply support needs, it does identify availability of NOAA-NMFS tanks at Kewalo Basin, Oahu. In addition, IBRRC has access to technical experts for stabilization and rehabilitation of marine mammals and sea turtles.

6. WILDLIFE RELEASE PROTOCOL

Release activities will be in accordance with the Hawaiian Contingency Area Plan. The wildlife release protocol will be developed by the Wildlife Branch Director (with support by IBRRC) and approved by the appropriate natural resource trustees. For marine mammal and sea turtles, NOAA Fisheries protocols and authorizations would be followed.

ICS Form 204 **FIELD ASSIGNMENTS** 23-May-01

DRAFT

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** All Phases			
Originating Section:	Planning - Environmental			
Operational Period:	Beginning	1-Aug-01	06:00	Wednesday
	Ending	31-Oct-01	06:00	Wednesday
	Duration	90 days		

Safey Message: When handling wildlife, adequate arm and eye protection is required. Follow all applicable OSHA standards when establishing utilities to any facilities. Maintain proper construction safety practices during construction activities.

CAPTURE AND RECOVERY GROUP

Supervisor: Tim Sutterfield/Steve Smith
Linda Elliot - IBRRC

Strategy: Group is activated if significant quantities of oil is released and wildlife impacted based on observation of natural resource trustees. This group would then establish search and capture teams, as required, to look for oiled wildlife.

Task: Identify appropriate trained personnel to monitor the oil response site.

Task: Identify appropriate trained personnel to monitor the normal nesting, haul out, and loafing sites as needed and if appropriate.

Task: Incorporate sample check in/check out and storage protocol per guidelines received by US Fish and Wildlife and HI DLNR.

RESOURCES

Position	Name	Equipment
Appropriate Trustees and Refuge personnel as applicable.		One vehicle (covered) required for each search and capture team
Assistants		
IBRRC and State		Area dependent Capture equipment available from State and CIC
State and Federal Trustees		

prepared by: Signature: ______________________

ICS Form 204 **FIELD ASSIGNMENTS** 23-May-01

DRAFT

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STABILIZATION GROUP

Supervisor: Linda Elliot
State DVM Dr. Greg Massey

TASKS:

1. Stand up the Clean Islands Council Oiled Bird Stabilization Module, as required.
   See attached Sketch. Stand up of this module means providing electricity and water.
   Unit will not be manned unless oiled birds are discovered.

2. Coordinate with selected site managers to determine facility location and develop utilities.

3. Further establish Cleaning and Rehabilitation facilities in the event of oiled wildlife, as required.

4. Breakdown, restore and store the facilities upon completion of the project.

RESOURCES

Position	**Name**		**Equipment**
Stabilization Unit	Linda Elliot	IBRRC	24 foot Stabilization Container - CIC (See attached Sketch)
State Veteranarian	Dr. Greg Massey	State DOFAW	
Treatment Specialist		IBRRC	
Assistants	Stanley Souza	PENCO	
Construction Leader	Paul Pollack	CIC	

Assistance provided by PENCO and Metson Marine

prepared by: Signature: ____________________

ICS Form 204	FIELD ASSIGNMENTS	23-May-01

DRAFT

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REHABILITATION GROUP

Supervisor:	Linda Elliot, IBRRC
State DVM	Dr. Greg Massey

TASKS:

1. Stand up oiled wildlife rehabilitation facilities, as required and in coordination with appropriate wildlife trustees. Clean Islands Council and State have worked together to construct water conditioner units for cleaning oiled birds.

2. Coordinate with selected site managers to determine facility location and develop utilities.

3. Properly handle, store and dispose of all waste and debris.

4. Breakdown, restore and store the facilities upon completion of the project.

RESOURCES

Position	**Name**		**Equipment**
Rehabilitaion Unit	Linda Elliot	IBRRC	Facility specifications and supplies for long term oiled bird faclities found in the Honolulu Area Plan. Additional information can be provided by IBRRC.
State Veteranarian	Dr. Greg Massey	State DOFAW	
Treatment Specialist	Ms Linda Elliott	IBRRC	
Assistants	Stanley Souza	PENCO	

prepared by: Signature: ______________________

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
DIVISION OF LAW ENFORCEMENT

CHAIN OF CUSTODY RECORD

FILE NO.
INV.

DATE AND TIME OF SEIZURE:	REGION	EVIDENCE/PROPERTY SEIZED BY:

SOURCE OF EVIDENCE/PROPERTY (person and/or location)	CASE TITLE AND REMARKS:
☐ TAKEN FROM: ☐ RECEIVED FROM: ☐ FOUND AT: At the time of the tone it will be one in the morningl.	

ITEM NO.	DESCRIPTION OF EVIDENCE/PROPERTY (include Seizure Tag Numbers and any serial numbers):

ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA:
	Kim Beasley		Sept. 9 2000	☐ U.S. MAIL ☐ IN PERSON ☐ OTHER:
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: ☐ U.S. MAIL ☐ IN PERSON ☐ OTHER:
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: ☐ U.S. MAIL ☐ IN PERSON ☐ OTHER:
ITEM NO.	FROM: (PRINT NAME, AGENCY	RECEIPT SIGNATURE:	RECEIPT DATE:	

☐ **ADDITIONAL TRANSFERS ON REVERSE SIDE**

CHAIN OF CUSTODY RECORD
(continued)

FILE NO.
INV.

ITEM NO.	FROM: (PRINT NAME, AGENCY)	RELEASE SIGNATURE:	RELEASE DATE:	DELIVERED VIA: ☐ U.S. MAIL
ITEM NO.	FROM: (PRINT NAME, AGENCY)	RECEIPT SIGNATURE:	RECEIPT DATE:	☐ IN PERSON ☐ OTHER:
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U.S. GOVERNMENT PRINTING OFFICE : 1992 O - 326-777 : QL 3

HAWAI'I
OILED BIRD COLLECTION, STABILIZATION & TRANSPORTATION

STANDARD OPERATING PROCEDURES

For trained and qualified personnel only.

COLLECTION

Do not risk personal health and safety in an attempt to capture oiled birds.

1. Prior to beginning collection efforts, check in with Wildlife Branch Director Supervisor. Consult with IBRRC as necessary.
2. Work in teams of 2 or more individuals using proper capture equipment and procedures for each species of bird to be collected.
3. Begin chain of custody using an approved form.
4. Transport as soon as possible to a stabilization site.
5. As soon as possible, notify ICS/Wildlife Branch Director of species, number and condition of birds collected. If possible, provide hourly updates from the field.

STABILIZATION

1. Check birds for injuries, stop any bleeding, and/or stabilize any fractures. Consult with the response veterinarian/center.
2. If heavily oiled, remove large amounts of oil from eyes, nares, & glottis.
3. If transport time will exceed 2 hours, then rehydrate birds using warm electrolyte solution (e.g., Pedialyte: 30cc/kg of body weight) via gavage tube before beginning transport.
4. Observe birds for signs of hypo- or hyperthermia. If a problem is suspected, take cloacal temperature (n. 102 – 106F). Treat accordingly by providing heat (e.g., hand warmers, hot water bottles), or by cooling (e.g., swabbing the feet and legs with isopropyl alcohol) and providing ventilation.
5. Place birds in approved containers with one animal per container (e.g., airline travel kennel, pet carrier or cardboard box). Place containers in a well-ventilated, quiet, warm, and darkened area. Each container should have lots of ventilation openings with enough space between all containers for air to circulate. The container should be large enough for a bird to comfortably stand upright (approx. twice the size of the animal). The bottom of the container should be well padded with sheets, towels, or absorbent pads. Minimize visual and auditory stresses.
6. Maintain a written record of any treatment provided or important behavioral observations. Note date, time, and your name and address on record. Send record and chain of custody form with each bird during transport.

TRANSPORTATION

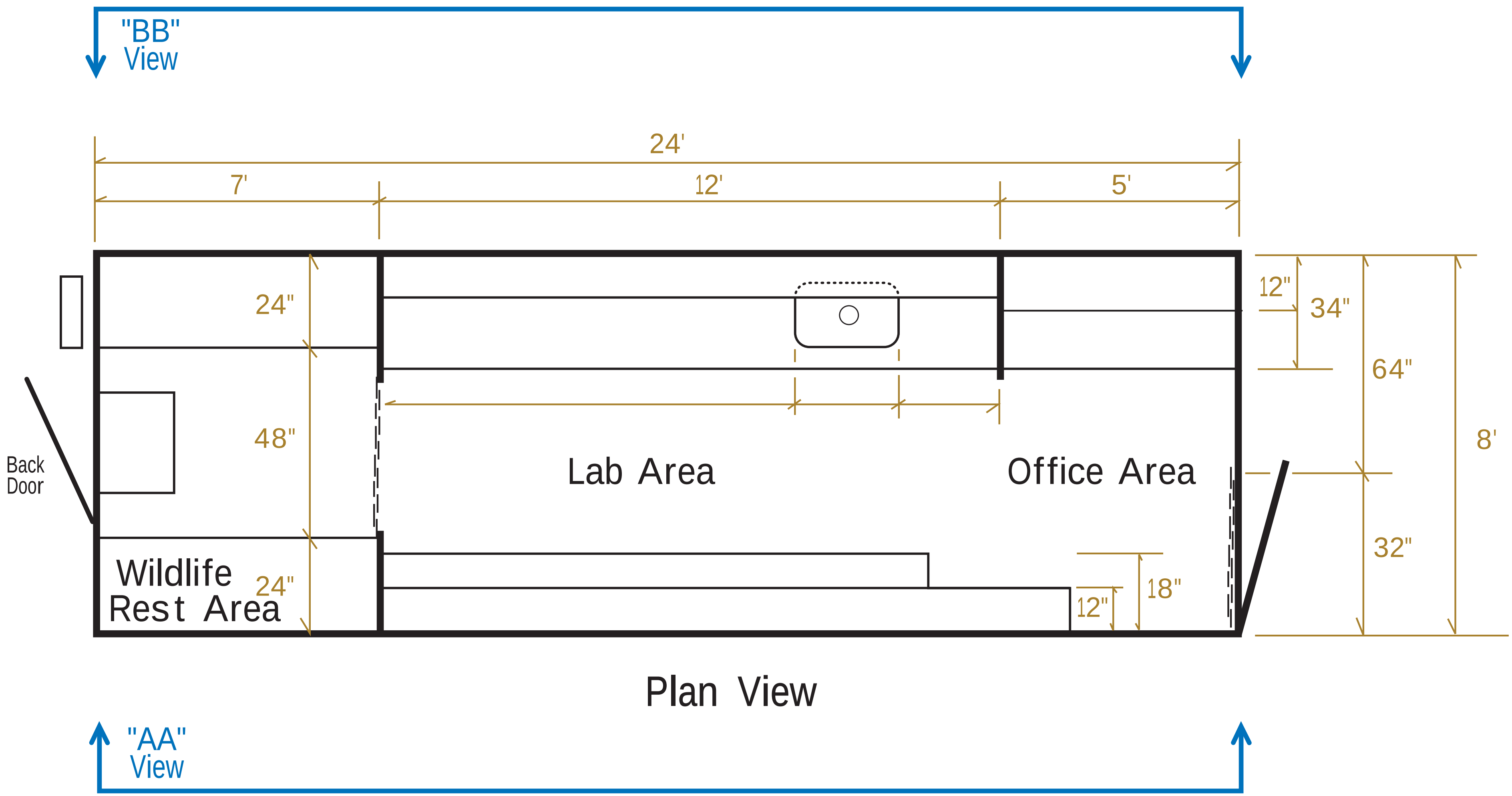
1. Keep length of transport to a minimum.
2. Transport in a well-ventilated vehicle to ensure the protection of humans and animals from volatile fumes. Maintain a warm temperature (~75-80F) within the vehicle, dry birds require cooler temperatures than do wet birds.
3. Do not leave wildlife unattended even if vehicle is air conditioned, and especially in direct sunlight.
4. Do not transport with water or food in any type of receptacle.
5. Attach address and telephone number of Wildlife Response Facility.
6. Provide a visual barrier on cage door and openings. Shade cloth/screening or a single sheet of newspaper taped around the edge works well. Cardboard, plastic or duct tape does not permit sufficient airflow. (See stabilization #4 for further description of appropriate containers.)
7. Keep noise levels to a minimum (e.g., talking, music).
8. Whenever possible, monitor the condition of birds during transport - especially on trips exceeding an hour.

INTERISLAND/COMMERCIAL TRANSPORT

1. All animals must pass agricultural inspection prior to transport. Containers must be labeled with a signed inspection sticker.
2. Clearly label containers: "CAUTION! LIVE BIRD: Handle carefully and keep away from face."
3. Notify personnel at the Wildlife Response Facility via phone call or facsimile of flight number, scheduled arrival time, number and type of birds being shipped.
4. If a bird's condition deteriorates during transport, call the response veterinarian/center immediately.

RESPONDER CHECKLIST:

REQUIRED	RECOMMENDED
❑ Safety and Site Orientation Meeting ❑ MSDS or Assay of spilled product ❑ HAZWOPR certification ❑ Personal Identification card ❑ PPE – Personal Protective Equipment: coveralls, boots, gloves ❑ Chain of Evidence Forms ❑ Cellular phone or 2 way radio ❑ Phone list: ICS, Wildlife Branch Director, Wildlife Recovery Group Supervisor, Stabilization and Rehabilitation Facility Managers ❑ Field Log Book & Pen/pencil ❑ Capture net ❑ Towel ❑ 2-3 Large Pillow Cases ❑ Garbage bags ❑ Duct tape ❑ Marker ❑ Scissors, pocket knife ❑ Airline kennels, pet carriers, or boxes ❑ A Partner ❑ Knowledge of stabilization site and /or transportation logistics to wildlife center ❑ Training in and knowledge of proper capture, handling & stabilization procedures for each species ❑ Stabilization supplies: Pedialyte, 60cc catheter tip syringe, catheter/feeding tube, thermometer & sterile lubricant, gauze pads, swabs, alcohol, medical tape and/or elastic bandage material (e.g., vetwrap). ❑ Large cooler with ice	❑ Maps of area ❑ PPE: Sunscreen, hat, water, sunglasses, safety glasses/goggles, life-vest (for surf zone, boats) ❑ Backpack or something similar ❑ Binoculars ❑ Fieldguide/wildlife ID cards ❑ First Aid Kit ❑ Wristwatch ❑ Camera ❑ Search, collection, & stabilization protocols

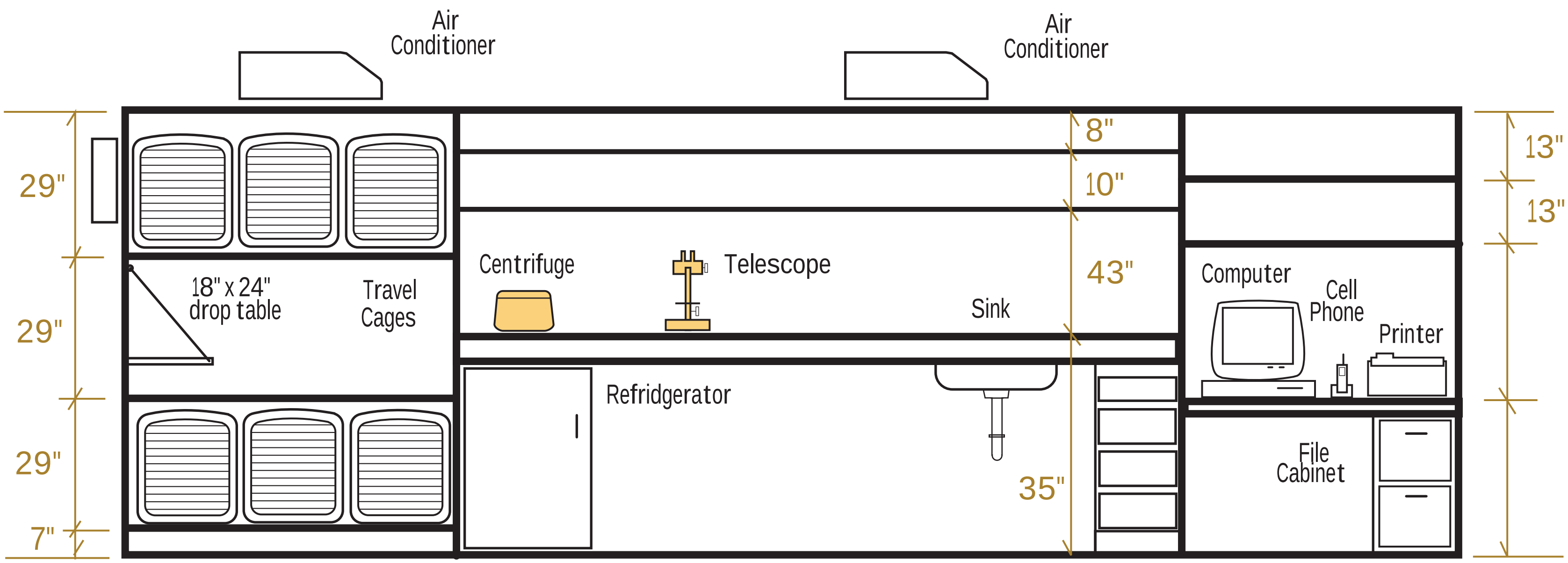


Plan View

Oiled Wildlife Stabilization Unit

Sketch 1 of 3

CLEAN ISLANDS COUNCIL

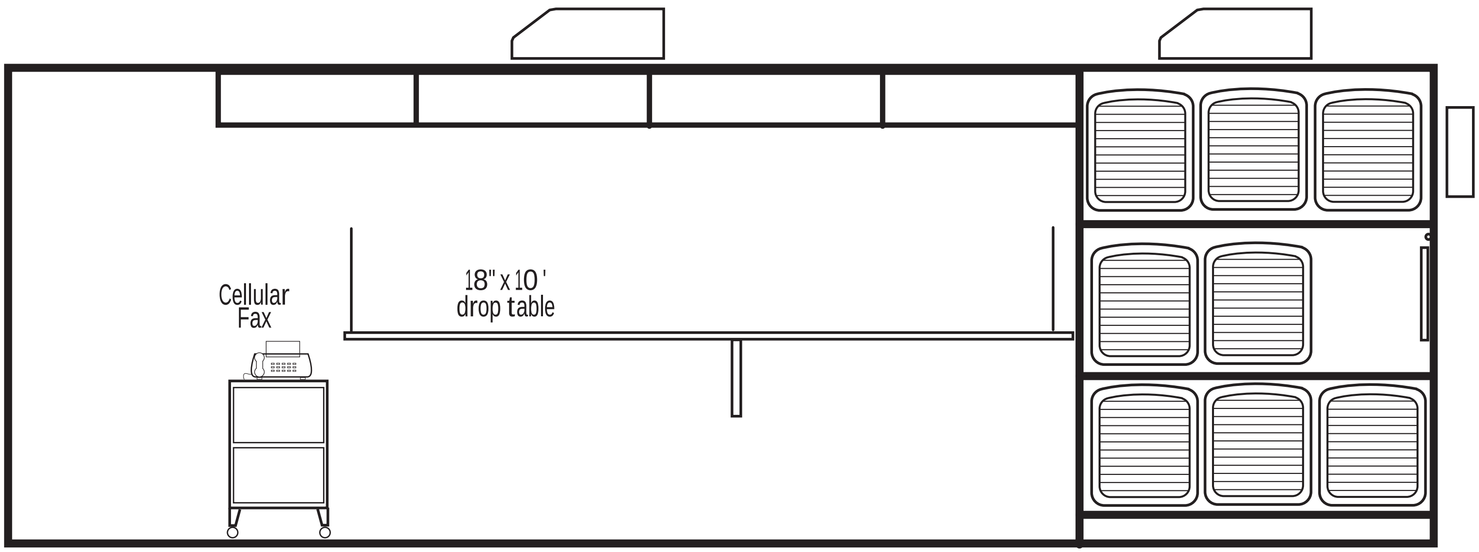


Elevation - "AA" View

Oiled Wildlife Stabilization Unit

Sketch 2 of 3

CLEAN ISLANDS COUNCIL



"BB" View Elevation

Oiled Wildlife Stabilization Unit

Sketch 3 of 3

CLEAN ISLANDS COUNCIL

PUBLIC AFFAIRS

31-May-01

All media inquiries should be referred to the Pacific Fleet Public Affairs at (808) 471-3769. Point of contact is Mr. Jon Yoshishige, Fleet Media Officer.

Public Affairs Plan to be developed.

Oiled Wildlife Management Plan

23-May-01

Incident Name:	**EHIME MARU OIL SPILL RESPONSE** **All Phases**			**DRAFT**
Originating Section:	Planning - Environmental			
Operational Period:	Beginning	1-Aug-01	06:00	Wednesday
	Ending	31-Oct-01	06:00	Wednesday
	Duration	90 days		

Safety Message: When handling wildlife, adequate arm and eye protection is required. Follow all applicable OSHA standards when establishing utilities to any facilities. Maintain proper construction safety practices during construction activities.

Branch: Wildlife

Supervisor: Tim Sutterfield/Steve Smith
USCG Rep:

Strategy: Be prepared to respond/manage/coordinate any oiled wildlife that may occur in association with any oil released from the Ehime Maru Recovery operations.

Tactic: Identify the resources required and available to respond to an oiled wildlife incident.

Tactic: Develop the 204's to be initiated in response to an oiled wildlife incident.

Tactic: Coordinate collection of bird feathers, fur, etc from wildlife for oil fingerprinting by USCG, if oiled wildife are observed in area and observed to encounter any oil

RESOURCES

Position	Name	Organization
Wildlife Branch Manager	Tim Sutterfield/Steve Smith	U.S. Navy
State of Hawaii Wildlife Response Manager and DVM	Dr. Greg Massey	State of Hawaii DOFAW
IBRRC Hawaii Manager	Ms Linda Elliott	IBRRC

prepared by:

Signature:

2. SEARCH AND CAPTURE DRAFT

A Capture and Retrieval Group with multiple teams will be initiated after notification of an oil release impacting wildlife. These teams will work to locate impacted wildlife and attempt to recover oiled wildlife for care. Observations will be made at the spill site, and as appropriate, at known population and nesting sites. If oiled wildlife is discovered and determined to be a result of any oil released from the Ehime Maru Recovery operation, more remote survey, capture and retrieval efforts may be undertaken. Observation at the recovery sites will determine whether additional observations will be required at known population and nesting sites.

Search and capture of oiled wildlife should only be done by trained personnel and in coordination with natural resource trustees per the Hawaiian Area Contingency Plan. For planning purposes, search and collection teams should each have 2 personnel (I.e. one IBRRS rep and one trustee).

If deemed appropriate after consultation with federal and state natural resource trustees, hazing techniques may be used to discourage animals from entering the oil release area. A hazing equipment use agreement has been established with the U.S. Dept of Agriculture, Wildlife Services Department that can be utilized through Clean Islands Council.

a. Oiled Birds

Search and capture of oiled birds must be done by permitted and trained personnel or the appropriate natural resource trustees.

* US Fish and Wildlife Service Contacts: Don Palawski, Kevin Foster or Beth Flint (808) 541-2749.
* Hawaii Department of Land and Natural Resources Oiled Wildlife Coordinator: Dr. Greg Massey, 808-572-3502.

Guidance for oiled bird collection, stabilization and transport is provided in Attachment 4.

b. Marine Mammals and Sea Turtles

Search and capture of marine mammals and sea turtles must be done by authorized and trained personnel or the appropriate natural resource trustees.

* NOAA - National Marine Fisheries Service Contacts: Margaret Dupree, John Henderson Bradley Ryon at (808) 973-2953, ext 210 or 973-2937 or 753-0341.
* Hawaii Department of Land & Natural Resources Aquatic Resources Division: Francis Oishi, 808-587-0094.

3. STABILIZATION

Stabilization facilities will be in accordance with the Hawaiian Area Plan and is usually established on a case by case basis and in coordination with the appropriate federal and state natural resource trustees. Requirements for an oiled bird stabilization facility are given in the Hawaiian Area Contingency Plan under the heading of "Primary Care Facility."

a. Oiled Birds

In this case, there is a potential for a release, the CIC oiled bird stabilization trailer will be available should oiled birds be identified as a result of the Ehime Maru recovery operation. A plan of the stabilization

DRAFT

unit is attached. If oiled birds are detected, a stabilization facility will immediately become operational and available to service affected wildlife for the first 24-48 hours after capture.

* For oiled birds discovered at the nesting sites at and around Marine Corps Base Kaneohe, a possible location for the stabilization module is at the MCBH- Kaneohe Bay, Environmental Office Base Yard.
* Other possible locations for the stabilization facility within the Pearl Harbor Naval Complex will be identified in coordination with IBRRC.

<u>b. Marine Mammals and Sea Turtles</u>
In the event marine mammals and or sea turtles are oiled, all capture, stabilization, and rehabilitation action shall be done in consultation with the appropriate natural resource trustees (identified under 2. Stabilization) Although the Hawaii Area Contingency Plan has limited guidance on stabilization and rehabilitation procedures, facilities or equipment/supply support needs, it does identify availability of NOAA-NMFS tanks at Kewalo Basin, Oahu. In addition, IBRRC has access to technical experts for stabilization and rehabilitation of marine mammals and sea turtles.

4 & 5. CLEANING AND REHABILITATION

Cleaning and rehabilitation activities will be in accordance with the Hawaiian Contingency Area Plan. The scale & type of facility will be developed on a species-specific, case by case basis. Facility requirements vary based on the numbers and the species of oiled wildlife discovered. Cleaning and rehabilitation facilities should be operational and available to service collected oiled wildlife from 24-48 hours after capture. When established, the cleaning and rehabilitation facility will operate under the direction the Wildlife Branch Director in coordination with IBRRC and the appropriate involved federal and state natural resource trustees.

<u>a. Oiled Birds</u>
In the event that oiled birds are found, they should be brought to the Stabilization Facility. Further, development of a cleaning capability and rehabilitation facilities may also need to be stood up.

* For oiled birds discovered at the nesting sites at and around Marine Corps Base Kaneohe, possible location for the stabilization module is at the MCBH- Kaneohe Bay, Environmental Office Base Yard.
* Other possible locations for cleaning and rehabilitation facilities within the Pearl Harbor Naval Complex will be identified based on input from USFWS and HI DLNR Wildlife Coordinator.

<u>b. Marine Mammals and Sea Turtles</u>
In the event marine mammals and or sea turtles are oiled, all capture, stabilization and rehabilitation action shall be done in consultation with the appropriate natural resource trustees (identified under 2. Stabilization) Although the Hawaiian Area Contingency Plan has limited guidance on stabilization and rehabilitation procedures, facilities or equipment/supply support needs, it does identify availability of NOAA-NMFS tanks at Kewalo Basin, Oahu. In addition, IBRRC has access to technical experts for stabilization and rehabilitation of marine mammals and sea turtles.

6. WILDLIFE RELEASE PROTOCOL

Release activities will be in accordance with the Hawaiian Contingency Area Plan. The wildlife release protocol will be developed by the Wildlife Branch Director (with support by IBRRC) and approved by the appropriate natural resource trustees. For marine mammal and sea turtles, NOAA Fisheries protocols and authorizations would be followed.

ICS Form 204

OILY WASTE DISPOSAL PLAN

23-May-01
18:00 hrs

Incident Name:	**Ehime Maru Recovery** Common Contents and Field Assignments all Phases			
Originating Section:	PLANNING - ENVIRONMENTAL		Branch:	Shoreline
Operational Period:	beginning	1-Aug-01	0600 hrs	Wednesday
	ending	3-Nov-01	0600 hrs	Sunday
	duration	93 days		

(* Subject to change based on recovery operation accomplishments)

Safey Message: All work is to be performed with consideration for Heat Stress Reduction issues. The Site Safety and Health and Medical plans must be prior to work.

Group:	**Disposal**	Supervisor:	Steve Christiansen
		USCG Rep:	As assigned.

LIQUID WASTES

1. All liquid waste collected from applicable locations shall be analyzed to determine the nature of the chemical makeup of the contaminant for documentation purposes and to determine proper disposal procedures

2. All liquid collectate is to be quantified either by weight or volume prior to disposal.

3. Disposal shall be in accordance with all Federal and State Regulations. Navy Public Works Center Pearl Harbor will disposal of all oil/fuel and hazardous waste. Local hazardous waste disposal companies will be used for disposal only if needed.

SOLID WASTES INCLUDING OILY BOOMS/ABSORBENT PADS/POM-POMS

1. All solid wastes collected from applicable locations shall be analyzed to determine the nature of the chemical makeup of the contaminant for documentation purposes and to determine proper disposal. (Note: liquid analyzed from the same source may apply)

2. Separate all waste streams keeping like materials together - and apart from other waste types.

3. Field storage of oily sorbents shall be in lined roll-off open top containers or similar holder in accordance with all Federal and State Regulations.

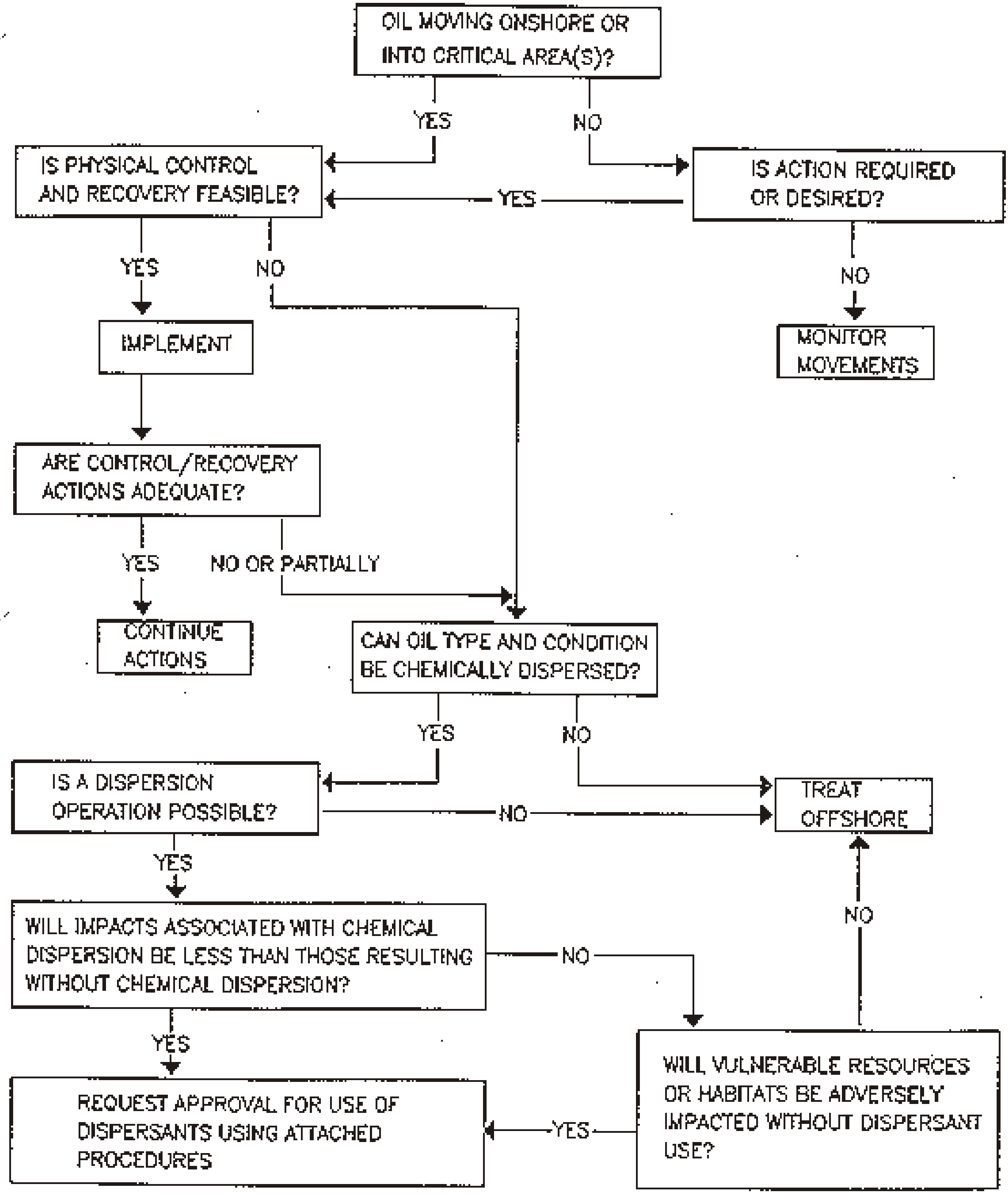
4. All solid waste material collected is to be quantified by weight or volume prior to disposal. The liquid content volume recovered in sorbents should be estimated for documentation.

5. Sorbent materials are to be removed from the roll off (or similar) containers only on to visqueen-lined designated storage areas. Establish a moisture removal area directly adjacent to the designated storage areas. Remove excess moisture by squeezing, wringing or other agreed upon method. Cut material into <3 foot lengths and remove and all metal. Processed sorbents are to be disposed of at H-power.

6. The roll off containers will be staged at the EDDM Facility or Victory Docks.

APPENDIX II

DISPERSANT USE DECISION MATRIX



APPENDIX I
DISPERSANT USE CHECK LIST

I. - SPILL DATA

a. Circumstances (fire, grounding, collision, etc.):	
b. Time/date of incident:	
c. Location of spill (distance off-shore, river mile, etc.):	
d. Type of oil:	
e. Volume spilled:	
f. Total potential of spill:	
g. Type of spill (instantaneous, continuous, intermittent):	

II - CHARACTERISTICS OF THE SPILLED OIL

a. Specific gravity:	
b. Viscosity:	
c. Pour point:	
d. Flash point:	
e. Relative toxicity:	
f. Other:	

III - WEATHER AND WATER CONDITIONS/FORECASTS

a. Air temperature/wind speed/wind direction:	
b. Tide and currant information:	
c. Water temperature and salinity:	
d. Water depth:	
e. Sea state:	

IV - OIL TRAJECTORY INFORMATION

a. 12 hour surface oil trajectory forecast:

1. Time to landfall:	
2. Expected areas of landfall:	

V - CHARACTERISTICS OF AVAILABLE DISPERSANTS AND APPLICATION EQUIPMENT

a. Dispersant characteristics

	Product One	**Product Two**
1 Name		
2. Manufacturer		
3. Type (self-mix, concentrate, etc.)		
4. When available		
5. Location		
6. Amount available		
7. Type container		
8. Characteristics		
(a.) toxicity		
(b.) reactions		
(c.) applicability to spilled oil		
(d.) other		
9. Application method		
10. Application rate		

VI - INFORMATION ABOUT PROPOSED DISPERSANT AND EQUIPMENT TO BE USED

a. Proposed dispersant	
b. Efficiency under existing conditions (% & vol. dispersed):	
c. Dispersant operation schedule:	
d. Location to be treated	
e. Surface area of the slick which can be treated in the scheduled time period	

VII - FEASIBLE AND AVAILABLE MECHANICAL METHODS AND TIME CONSIDERATIONS FOR CONTAINMENT AND CLEANUP

	Untreated Oil	Treated Oil
a. Containment of the source:		
b. Shoreline protection strategy:		
c. Shoreline cleanup strategy:		
d. Time required to execute response:		

VIII - HABITATS AND RESOURCES AT I-ISK

a. Shoreline habitat type and area of impact:

1.	
2.	
3.	
4.	

b. Resources:

1. endangered/threatened species:	
2. marine mammals (pupping, migration):	
3. waterfowl use (nesting, migration):	
4. shellfish (spawning, harvesting):	
5. finfish (spawning, release migration, harvest):	
6. commercial use (aquaculture, water intakes, etc.):	
7. public use areas (parks, marinas, etc.):	
8. other resources of special significance:	
* indicates seasonal considerations	

IX - PUBLIC HEALTH IMPACTS

a. Impact of undispersed oil to public health	
b. Impact of dispersed oil to public health	

X - RECOMMENDATION TO THE RRT

a. DO NOT use dispersants

b. Use dispersants to the maximum extent possible

c Use dispersants on a trial basis, to ensure effectiveness

d Use dispersants in limited or selected areas.

On-Scene Coordinator

____
Signature Time/Date

XI - RRT EVALUATION OF A DISPERSANT APPLICATION DECISION

a. Will application of dispersants remove a significant amount of the oil slick from the water surface?

b. Can dispersants alter the extent or location of shoreline impacts?

c. Can the damage to endangered or threatened species, marine mammals, waterfowl be decreased?

d. Will the damage to habitats and resources from chemical dispersion be less than those without chemical dispersion?

e. If recreational, economic and aesthetic considerations are a higher priority than natural resource considerations,what is the most effective means of their protection?

CONCUR/DO NOT CONCUR to use dispersants:

U. S. Environmental Protection Agency

Signature	Time/Date

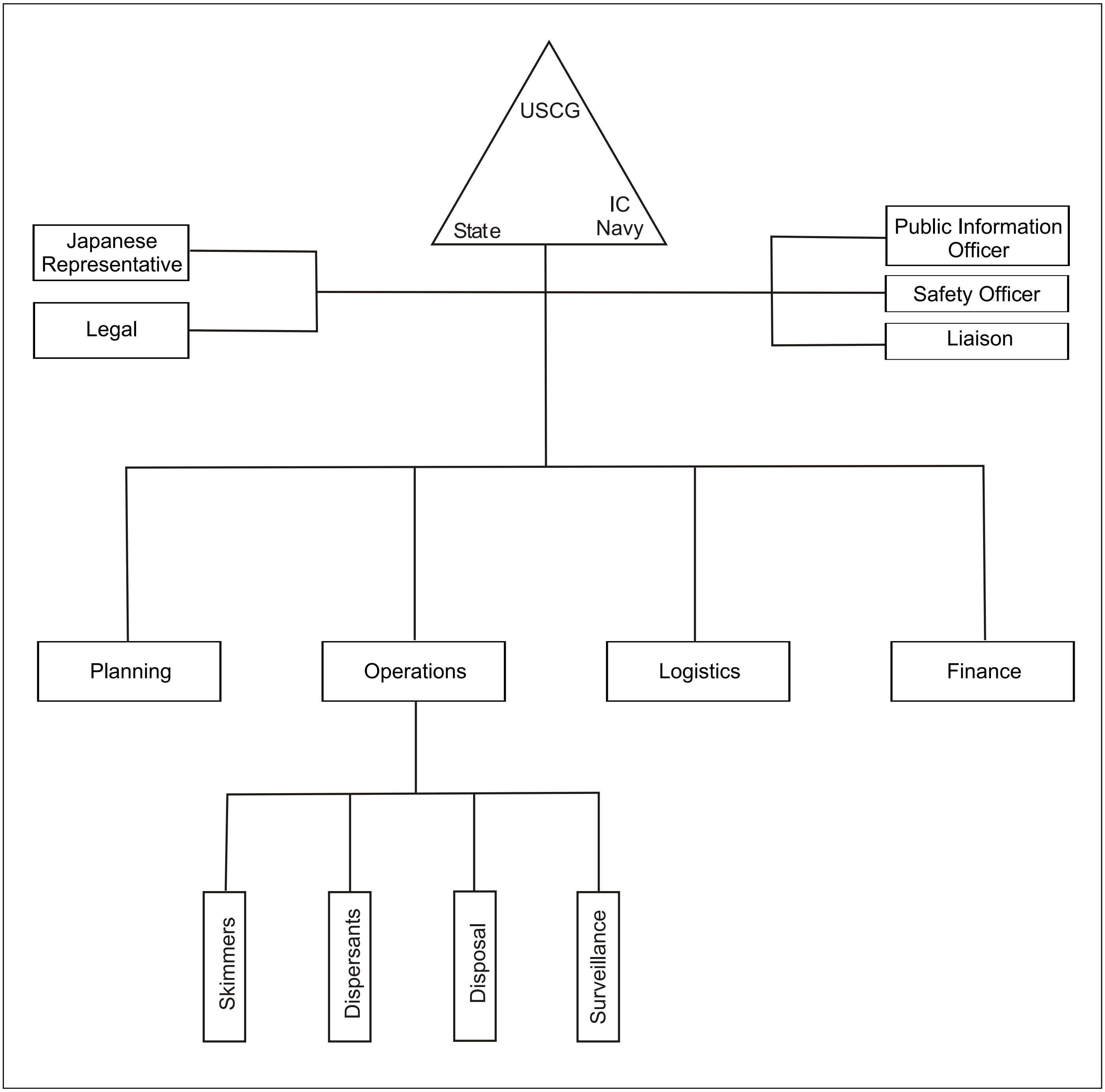
CONCUR/DO NOT CONCUR to use dispersants

State of Hawaii

Signature	Time/Date

ICS Form 205			COMMUNICATIONS PLAN			
ORGANIZATION and CONTACT	A/C	PHONE	FAX	CELLULAR	PAGER	EMAIL
US NAVY, CINCPACFLT						
RADM Klemm	808					
LCDR Neil Sheehan	808					
LCDR Steven Stancy	808					
Carolyn Winters	808					
Jon Yoshishige	808					
US NAVY, REGION						
Pearl Cowan	808					
Cynthia Pang	808					
Lt. Ken Ingram	808					
Rebecca Hommon	808					
US NAVY, DIVING and SALVAGE						
CDR Mike Donch	808					
US NAVY NAVSEA						
Greg Baumann	703					
Bill Walker (Pollution)	703					
FOSC USCG	808	522-8260	522-8270			
Port Operations	808	522-8260	522-8270			
Duty Officer	808	522-8260	522-8270	927-0830		
Capt. Gilbert Kanazawa	808	522-8260	522-8270			
Ltcmdr. John Sifling	808	522-8260	522-8270			
Chris Curatilo	808	522-8260	522-8270			
SOSC DEPT. OF HEALTH	808	586-4249	586-7537		After Hrs Pager:	247-2191
Curtis Martin	808	586-4249	586-7537			
Keith Kawaoka	808	586-4249	586-7537			
US EPA, REGION IX	415	744-2000				
Mike Ardito	415	744-2328				
NAT. OCEANIC ATMS. ADM. NOAA						
Ken Barton	206	256-6326	526-6329			
Sharon Christopherson	206	526-6829	526-6329			
John Naughton	808	973-2935				
US FISH and WILDLIFE SERVICE						
John Hickey	808	541-3441	541-3470			
Mike Molina	808	541-3441	541-3470			
Kevin Foster	808	541-3441	541-3470			
STATE OF HAWAII DEPARTMENT of LAND and NATURAL RESOURCES						
Francis Oishi	808	587-0094				
Brian Kanenake	808	587-0332				
EDAW						
Randy Gallien	808	949-4321				
Edd Joy	808	949-4321				
John Prince	808	949-4321				
CLEAN ISLANDS COUNCIL						
Kim Beasley	808	845-8465	845-8457			kimb@cleanislands.com
PENCO	808	545-5195	538-1703		948-1911	
Rusty Nall	808	545-5195	538-1703			rusty@penco.org

 updated: 23-May-01



Incident Command System for Diesel Fuel and Lubricating Oil Release Response

APPENDIX G
FEASIBILITY STUDY

Plan for Raising Fishing Vessel Ehime Maru to Allow Recovery of Crewmembers

13 April 2001

Prepared by:
Naval Sea Systems Command,
Supervisor of Salvage and Diving (SEA 00C)

Table of Contents

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Introduction

Tasking

The fishing vessel Ehime Maru sank in 600 meters, following a collision with USS GREENEVILLE (SSN 772). At the time of the sinking, all but nine of the crewmembers were successfully rescued. Following an extensive air/sea search, and a subsea search and visual inspection of the vessel's exterior, it is assumed that some, or all, of the missing crew became trapped inside the vessel. Commander in Chief, U.S. Pacific Fleet requested that Naval Sea Systems Command (NAVSEA), locate the vessel and provide a plan for recovering the missing crewmembers.

Statement of Condition of Vessel on Bottom

The Deep Submergence Unit Remotely Operated Vehicle (ROV) located Ehime Maru on 9 February at 157° 49' West Longitude and 21° 05' North Latitude. The vessel is sitting upright on the bottom but has obvious hull damage. Detailed salvage surveys were conducted by NAVSEA and Deep Submergence Unit ROVs, producing in excess of 20 hours of videotape. A pair of salvage masters from Smit Tak, a salvage contractor from Rotterdam, and a Japanese team of salvage experts viewed Ehime Maru via the video feed from the ROVs. The ship characteristics taken from the shipbuilder's drawings are as follows:

Ship's Characteristics	
IMO Number	**9142281**
Length Overall	**58.18 Meters**
Length Between Perpendiculars	**50 Meters**
Beam	**9.30 Meters**
Draft	**3.50 Meters**
Depth	**3.90 Meters**
Light Ship Weight	**754 Metric Tons**
Gross Tonnage	**499 Metric Tons**

Given the 600-meter depth of the Ehime Maru, its light ship weight and damaged condition, this will be a precedent setting operation, as characterized in Figure 1.

Damage that is evident from the video survey is highlighted in Figures 2, 3, and 4. The most obvious damage (shown in the pictures in Figures 3 and 4) is seen in the forward port and starboard shell plating in way of frame 68. Here the plating has visible buckling presumably from the impact of the vessel when it hit bottom. Other obvious damage includes bending of the forward mast to port and minor shell plate buckling at the stern and bow. She sits with her stern buried up to two meters in the sandy bottom with her rudder and screw not visible.

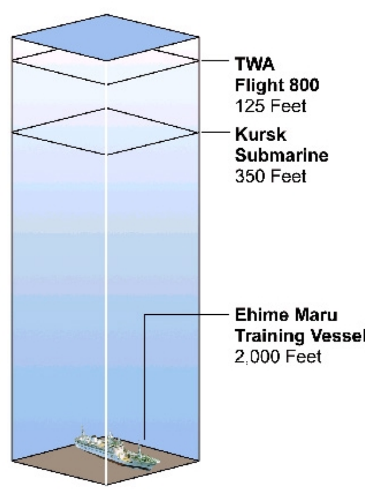


Figure 1. Depth Comparison

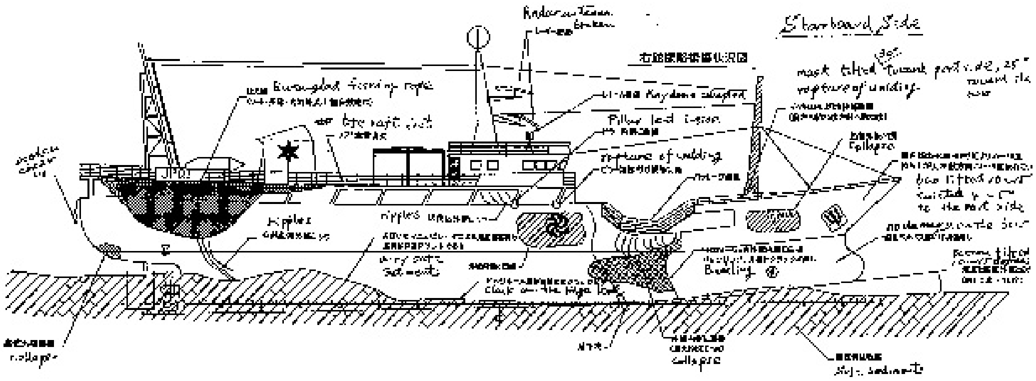


Figure 2 – Starboard Side View

Figure 3 – Starboard Side Forward

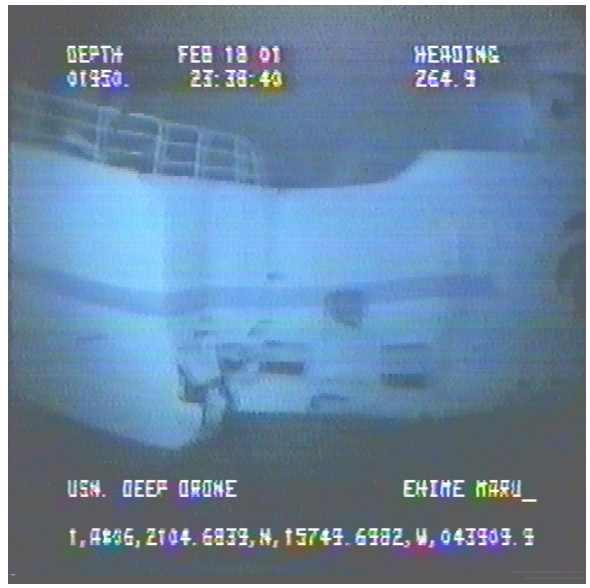


Figure 4 – Port Side Forward

Impact of Damage on Options

Additional hull damage at frame 18 is anticipated due to the rapid nature of the sinking of Ehime Maru and damage sustained by the USS GREENEVILLE's rudder. Rough order of magnitude calculations for flooding that would cause the vessel to sink in 10 minutes or less suggest a hole of approximately 10 m^2. Also, it is assumed that major athwart ship bulkheads were breached by the GREENEVILLE's rudder. Using a hull model based on a beam type finite element of at least 200 nodes and the shipbuilder’s light ship weight distribution, multiple bending moment curves were developed for various lifting arrangements. Section moduli were adjusted in the vicinity of frame 18 and frame 68 based on the observed or suspected worst-case damage to these areas. Specific reduction in the section modulus at frame 68 assumed that only the center girder and side girders up to 1500mm off centerline along with the bottom and inner bottom were effective in accepting the loads produced by various lift configurations. Figure 5 provides a graphical depiction of the cross section at frame 68.

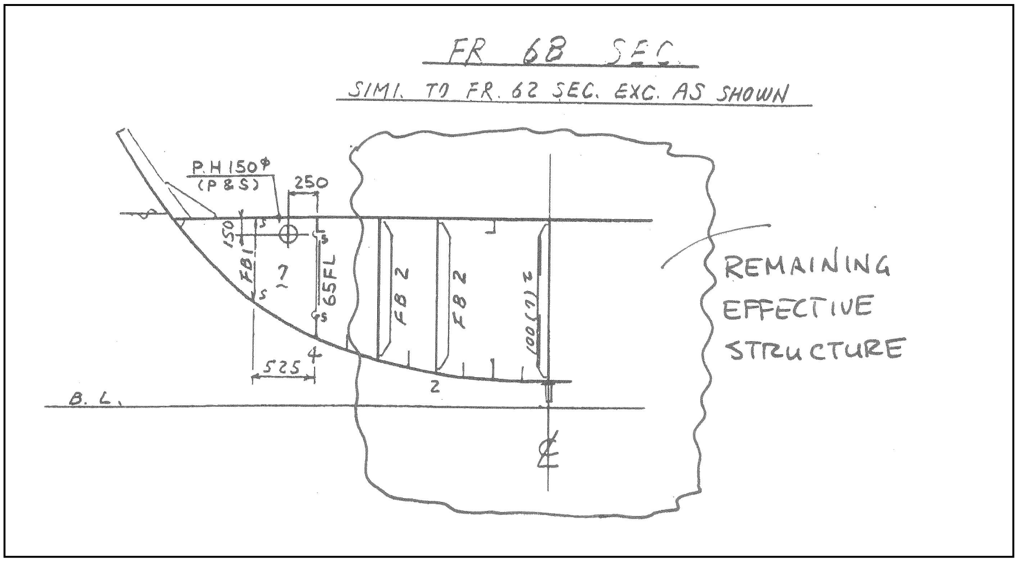


Figure 5 – Cross Section at Frame 68

For the aft damage adjacent to frame 18 the center girder, side girders up to 1500mm from centerline and bottom and inner bottom were assumed to be damaged and unable to carry any load. Figure 6 describes the section. Note that poop deck and navigational decks are excluded as load bearing structure.

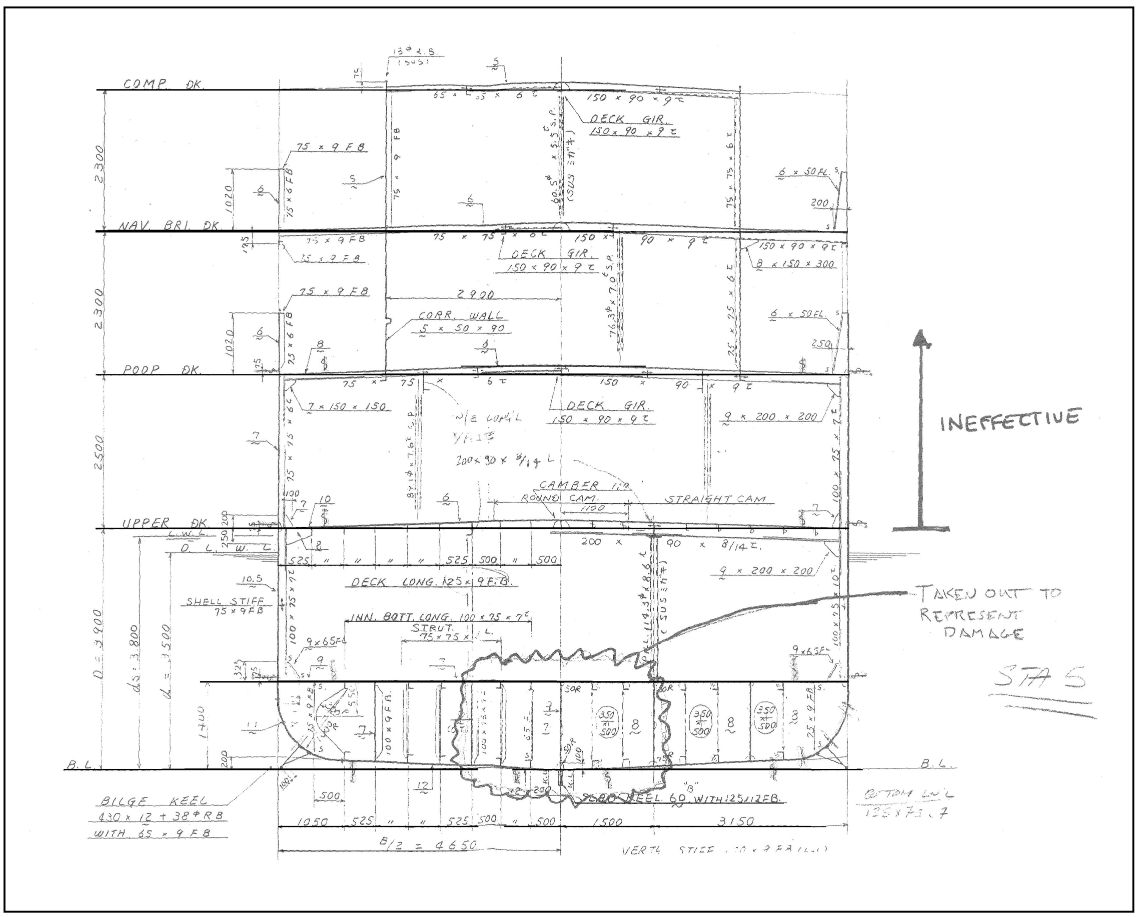


Figure 6 – Cross Section Damage, Frame 18

Using multiple bending moment scenarios, compressive and tensile stresses on the hull were calculated to assess the likelihood of structural failure of the hull during lifting. Localized panel buckling was also considered. At frame 68, where the visible hull damage is most prominent, calculated bending stresses approach yield for the static load imposed in dead lifting the vessel from the bottom. From the static analysis and concurrent dynamic analysis conducted on proposed lift configurations with typical Multi-Purpose Support Vessel sea keeping response profiles, a direct lift to the surface and up onto an ocean-going barge was deemed to be an unacceptable risk.

Options Considered Based on the Damage to the Hull

The first option considered for recovering remains of crewmembers was the use of a mini-ROV to enter the hull and search for and recover crewmembers. Once the vessel was located and found to be intact but with damage to internal bulkheads, this option was deemed not feasible. This type of operation has two problems: first, a precision method of cutting to provide access at that depth does not currently exist and second, fouling of the ROV's umbilical inside Ehime Maru is a major drawback. Without clear definition of where to locate remains, a full search of all compartments would be necessary. Based on the damage visible to the exterior hull and projecting damage to the stern based on the penetration of USS GREENEVILLE's rudder, it is reasonable to assume that bulkheads and piping on the interior also suffered damage. This would increase the likelihood that a mini-ROV would become fouled and unable to accomplish a recovery.

An alternative method for conducting an internal search of the hull would be to use saturation divers. However, at 600m this is not a viable option. Though open ocean dives have been accomplished at this depth, the extensive work of recovering crewmember remains would be not be possible.

Method Selected

To safely recover crewmember remains, the only feasible approach is to rig Ehime Maru on the bottom with lifting straps, lift her off the bottom, and transit to a shallow site. There the vessel can be laid down on the bottom and divers can conduct a thorough survey of all compartments. This method eliminates the adverse affects of lifting the vessel out of the water and maintains Ehime Maru close to the bottom during transit. Rigging for the lift will be accomplished using ROVs, which limits use of typical eductor type tunneling equipment. From multiple bending moment calculations, use of a pair of straps lifting at frames 15 and 61 provides the necessary support and allows effective balancing of the load. Placement of the straps presents a challenge as up to two meters of the hull is buried in the sandy bottom.

Two alternatives are being investigated to position the straps. First would be using a directional drilling technique to tunnel under the vessel passing steel plate straps. This would eliminate the need to stress the hull by lifting to place the straps underneath. Should directional drilling not prove effective, a second method is passing a wire under the stern aft of the rudderpost as the vessel currently sets. Lifting from this aft position enough to pass the straps would set up a bending moment, placing compressive stresses on the poop and navigational decks that may buckle these non-strength members. However, the upper deck and side shell will be able to accept the load.

Discussion of Plan

Phase II - Mobilize Salvage Forces

Mobilization of salvage forces includes the acquisition, charter, rent, and manufacture of all equipment necessary to support the operation. This mobilization is driven by the requirement to complete the lift and relocate Ehime Maru to the near-shore site at a 30m depth by the end of August to optimize weather conditions. The major equipment required to perform the salvage operation includes:

- Coiled tube drilling system
- Remotely Operated Vehicles (2)
- WASP One Atmosphere Suit
- Special equipment design and fabrication including sheaves, clumps, spreader assembly, lifting frame, and general salvage support hardware
- Anchor handling tug
- Linear winches
- Lifting wire
- Multi-purpose support vessel
- Ocean going barge with tug for supporting diver operations and disposal.

The overall timeline for mobilization is shown in Figure 7, leading to the relocation of Ehime Maru by 15 September. Commitment for the floating assets is critical; specifically the ROCKWATER 2 (RW2), which is a Halliburton owned ship. As shown, the long lead systems include the coiled tube drilling system and the engineering, fabrication, and procurement of salvage systems. Both of these systems have been started via contract with Smit-Tak and will be completed in 70 days in Houston in order to meet the required shipment date for transport to Hawaii. Equipment will be ready for shipment in mid-June. The shipment to Hawaii will take 22 days so that all equipment will be staged in Hawaii in mid-July to commence outfitting of the RW2. Specific discussions of the equipment is included in the Phase III and IV sections of this report.

Mobilization of the linear winches and two lengths of 115mm wire rope will commence in Rotterdam in late May and will take 40 days for shipment to Hawaii. The winches and wire will be available for installation on RW2 in mid-July.

The ROVs and WASP are currently located in Houston and will be mobilized for shipment to Hawaii onboard the anchor handling tug in mid-June for arrival in Hawaii in mid-July.

Mobilization of an anchor handling tug will start in mid-June in Houston. The tug will be loaded with the coiled tube drilling system, salvage support equipment, ROVs, and WASP. She will depart Houston in mid-June for arrival in Hawaii in mid-July.

Mobilization of the RW2 will commence on 20 June in the Philippines. Transit time to Hawaii will take 20 days so that she will be available in Hawaii for outfitting in mid-July. The outfitting of RW2 with all salvage support equipment is scheduled for 14 days. The ship will be fully outfitted and ready to commence the salvage operation by 01 August.

Additional assets and equipment are required for supporting the divers during the crewmember recovery phase, the fuel offloading phase, and the disposal phase. NAVSEA has contracted Crowley Marine to provide support for these phases. This support will consist of an ocean going barge with ballast lift capability, tug, and support equipment. Crowley will mobilize the barge and tug from the West Coast of the U.S. in mid-August and commence outfitting of diving support and lift support equipment in late August. Crowley will provide support equipment including mooring systems, crane, power, accommodations, and hotel services. The diving equipment will be provided by Mobile Diving and Salvage Unit One (MDSU ONE). The barge and tug will support the crewmember recovery operations until completion, currently scheduled for mid-October.

At the completion of the crewmember recovery, Crowley will support the MDSU divers in the fuel offloading using hot tap systems and other means. This phase is estimated to be complete in seven days.

The final phase will be deep sea disposal of Ehime Maru. Crowley's barge and tug will be configured to perform a ballast lift of Ehime Maru two meters off the bottom and transport to a selected deep water site. Ehime Maru will be sunk at that final site. Estimated time for this phase is seven days.

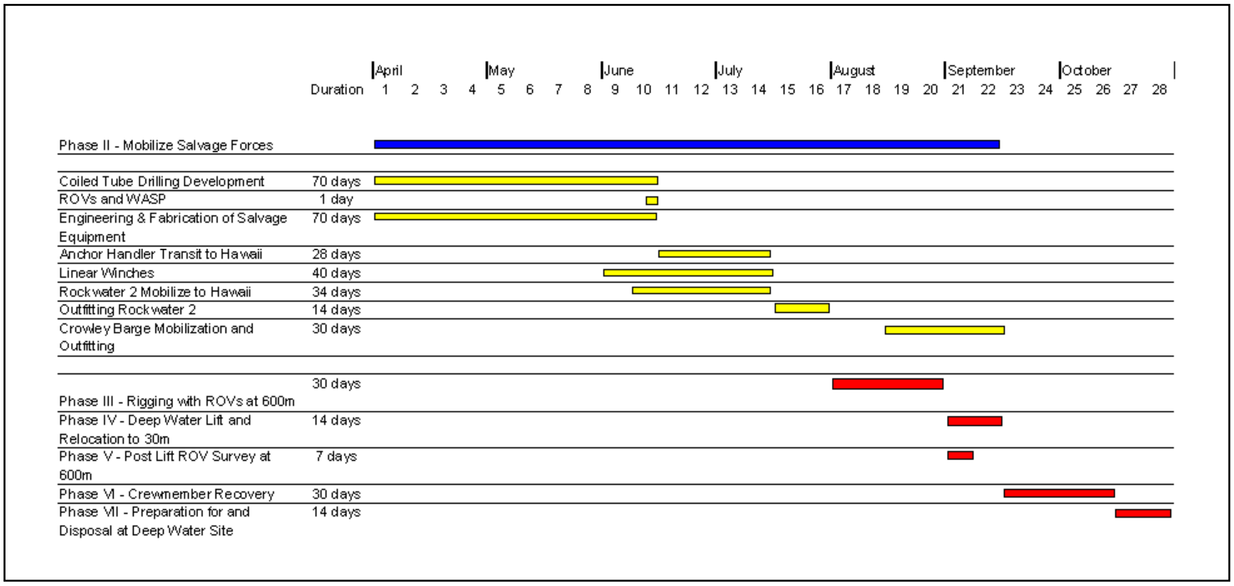


Figure 7 – Mobilization Timeline

Phase III - Rigging w/ ROV

This phase of the operation will include preparation of Ehime Maru for lifting from 600m depth. The operation will utilize two floating assets for accomplishment; the RW2 and an anchor handling tug. The RW2 is a multi-purpose support vessel with dynamic positioning capability, heave compensated crane, and other assets necessary for performance of the operation. She will be outfitted with special drilling equipment, linear traction winches, lifting wire, two Remotely Operated Vehicles, a WASP One Atmosphere Diving Suit, and all fabricated hardware for the operation. The rigging will be performed in several sequential steps as follows:

a. Inspection of Ehime Maru by ROV – A thorough inspection of Ehime Maru will be performed by one of the ROVs to finalize details for the rigging. During this inspection, a number of tests and trials will be performed including scouring out the area beneath the bow of Ehime Maru.

b. Removal of Debris – The ROVs will be used to remove and recover any debris attached to or around Ehime Maru including fishing nets, lines, rafts, and rigging on the masts.

c. Placement of Lifting Plates and Aligning Clumps – The RW2 salvage crew will place various equipment on the seafloor adjacent to Ehime Maru in preparation for installation of the lifting plates

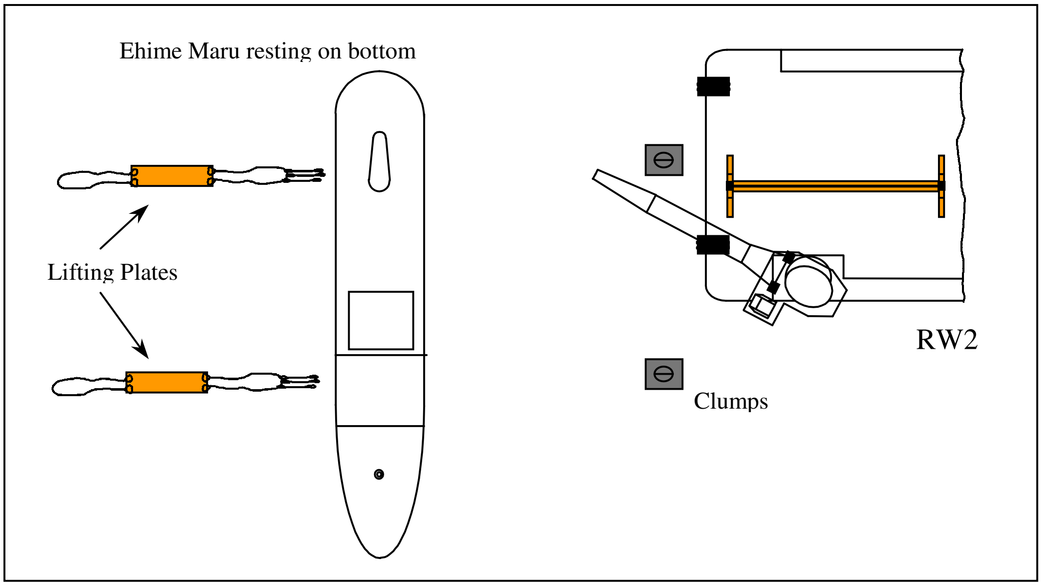


Figure 8 – Positioning the Lifting Plates and Clump Weights on the Seabed

(Figure 8). The lifting plates are 14m x 1.25m x 11mm with bridle terminations on each end. This will be accomplished using the heave compensated crane and a long baseline precision navigation system.

d. Coiled Tube Drilling – The coiled tube drilling system will be utilized to drill beneath the hull of Ehime Maru. The system developed in Houston is shown schematically in Figure 9. The figure shows the system supported from the surface with the actual drilling system on deck. An alternate system with the drilling head positioned on the bottom is also being considered. Final system selection will be made within the first month of the development process. As shown on the figure, a hole (approximately 350mm) will be drilled beneath Ehime Maru using the directional capability of the system. Additional holes may be drilled parallel to the original hole depending on the testing that will be performed in Houston prior to mobilization. The process will be repeated for both forward and aft lifting plate locations.

e. Lifting Plate Installation – After the holes are drilled beneath Ehime Maru, messenger lines will be utilized to attach to the ends of the lifting plates. High strength wire ropes will be attached to the lifting plates through the drilled holes and reaved around sheaves on the clumps. A water jetting assembly will be attached to the end of the lifting plate to assist in the extrusion of the plate through the sediment beneath Ehime Maru. The plates will be pulled through the drilled holes using either the ship's heave compensated crane or the anchor handling tug. A contingency plan has been developed in case the drilling operation is not successful. That alternate plan includes lifting the stern of Ehime Maru by the RW2 to gain access to pull the lifting plates under the hull. Access to the stern area is available to pass a sling. This method requires lifting the stern about four degrees allowing access for installation of the two lifting plates.

f. Installation of Spreader Assembly – The final step in the rigging process is to install the spreader assembly, see Figure 10. The spreader assembly is positively buoyant by 20 tons and held down by clumps configured below the assembly and outboard of Ehime Maru suspended from brackets. The assembly will be lowered with the heave compensated crane and positioned over Ehime Maru at a pre-determined location. When properly positioned, the two lifting plates will be attached to the spreader assembly using messenger lines from the RW2. ROVs will be used extensively during all activities in

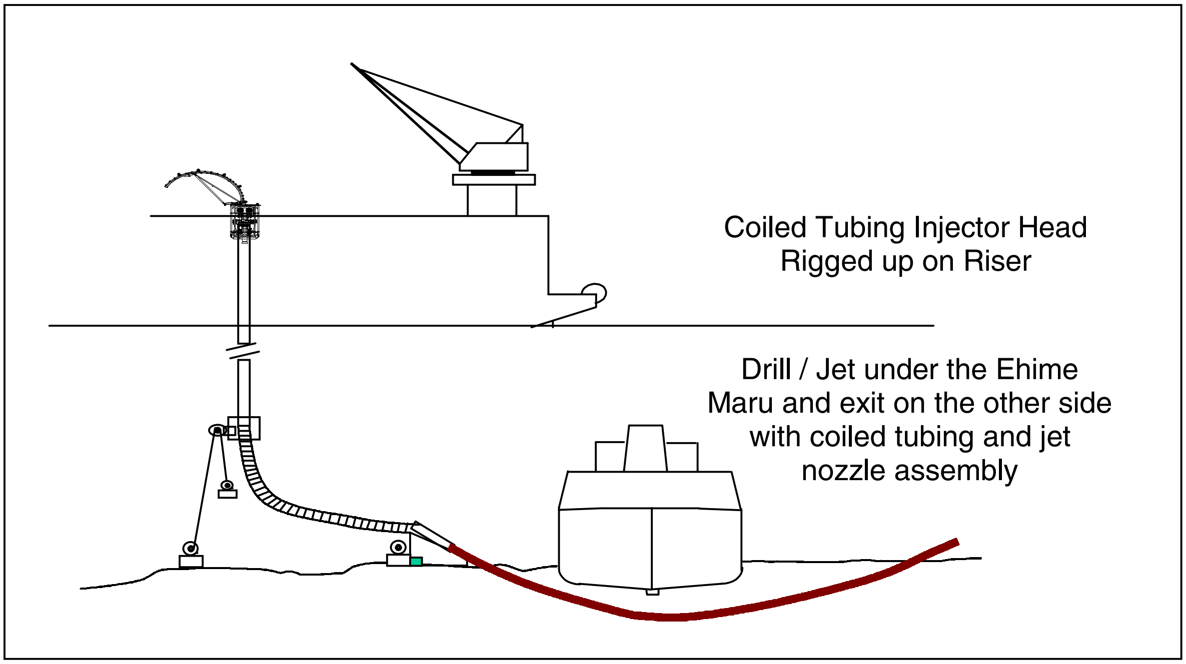


Figure 9 – Coil Tube Drilling System

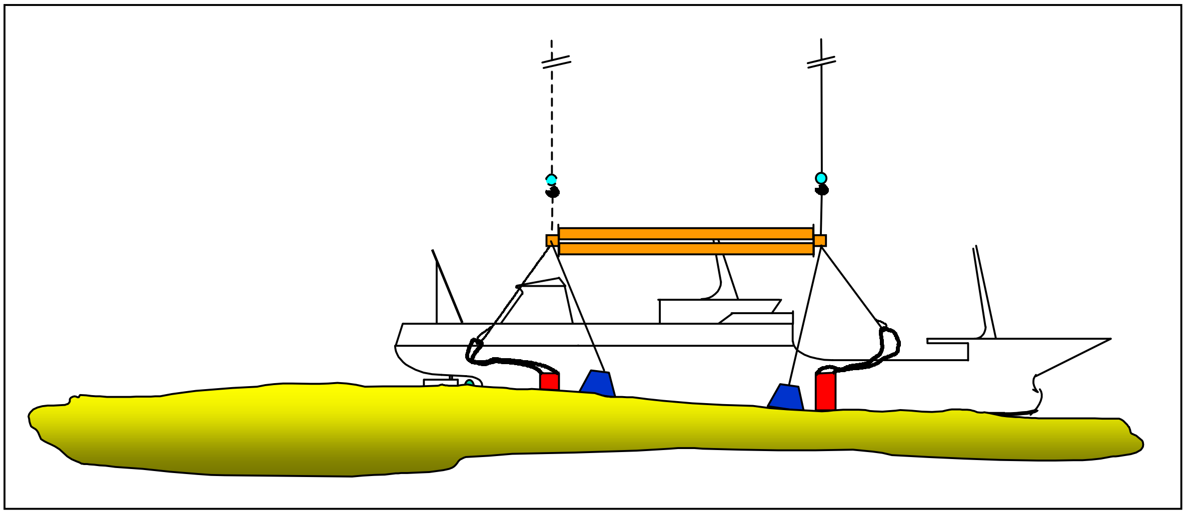


Figure 10 – Pulling the Slings into the Spreader Beam

this phase. Figure 10 shows the spreader assembly positioned above Ehime Maru and the ends of the lifting plates in the process of being attached to the spreader. Once the lifting plates are attached, Ehime Maru is fully rigged and ready to be lifted. The RW2 will then recover any rigging material left on the bottom.

Phase IV - Deep Water Lift and Transit to 30m Dive Site

This phase of the operation will include development of a bathymetric map of the seafloor along the route to be taken; making the initial lift of Ehime Maru from the seafloor; inspecting the vessel while suspended approximately 20m to 30m above the seafloor; transit to the 30m dive site and placing the hull on the bottom for the diver survey. Throughout each of the following steps of this phase, one of the ROVs will be deployed to monitor the condition of the hull and lifting rig (see Figure 11):

a. Bathymetric Survey. Prior to conducting the lift the routes between the salvage site, the diver inspection site and the final disposal site will be surveyed utilizing a precision fathometer coupled to a

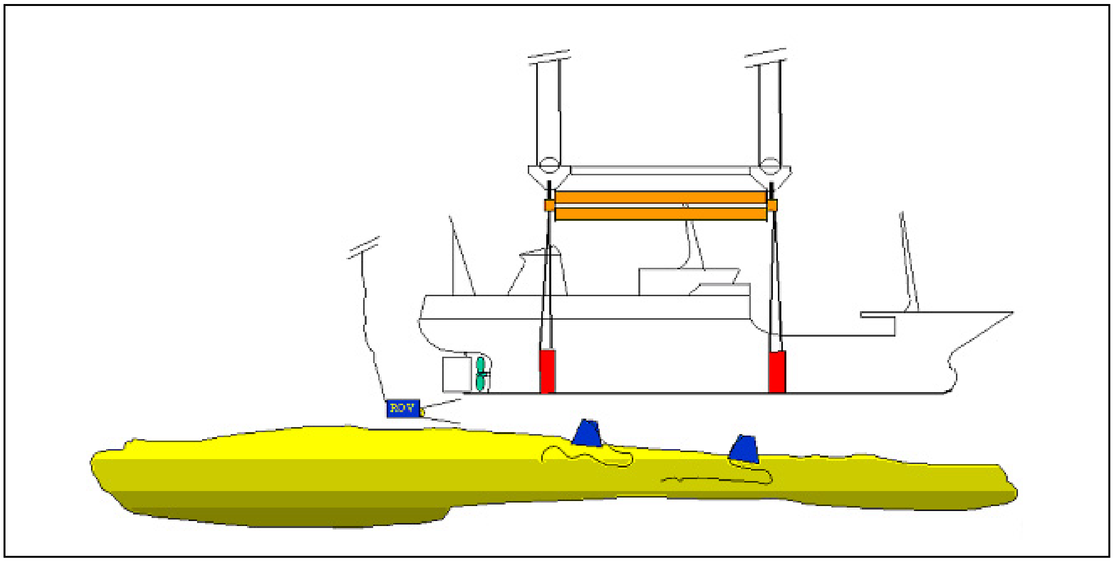


Figure 11 – Transit to 30m Dive Site

differential global positioning system or military GPS navigation system. This information will enable the RW2 to safely transit along the route with Ehime Maru suspended between five and fifteen meters above the seafloor.

b. Diver Survey of the 30m Site. At the 30m dive site, USN divers will conduct a thorough survey of the site and ensure that the bottom conditions will facilitate setting the hull down in a stable, upright position. They will also survey the anchor drop points for the moor that will be deployed to support the dive platform. Video documentation of the bottom will be made during each of the dives.

c. Sea Restrictions During the Lift and Transit. To ensure that the lift and transit is accomplished safely, a computer simulation with the RW2 and the proposed rigging material was done with wave heights up to four meters. To preclude any damage to Ehime Maru, transit will only be conducted if the forecast wave height is two meters or less.

d. Lift Timing. The lift will not commence until a 72-hour window of favorable weather is predicted. The salvage team will utilize USN weather services throughout the operation.

e. Transit to 30m Site. During transit to the 30m dive site one of the ROVs will be deployed to monitor the condition of Ehime Maru and the rigging gear. The ROV will utilize its sonar to ensure that Ehime Maru is maintained between 20m and 30m off the seafloor, and does not impact any outcrops, rocks or cliffs. The transit speed will not exceed one knot.

f. Remediation during Lift, Transit and Placement at 30m Site. Because oil might be released from the vessel during the lift or transit, a helicopter or fixed wing aircraft will be utilized to monitor for evidence of a release. A surface skimming system will be deployed with RW2 and an additional system will be on standby in Pearl Harbor. Subject to approval, two oil dispersant systems will be provided that can be deployed by helicopter. As RW2 approaches the 30m dive site, the second surface skimmer system will deploy to augment the initial system. Both skimmer systems will standby while Ehime Maru is placed on the bottom at the 30m site. Periodic over flights will continue to monitor for evidence of oil or fuel coming to the surface.

g. Bottom Stability of Ehime Maru at 30m Site. When Ehime Maru is placed on the bottom at the 30m site, an ROV will conduct a thorough survey of Ehime Maru to ensure that her hull rests solidly on the seafloor. To ensure diver safety, no dives will be attempted until the vessel has remained in a stable position for 24 hours. At that time, an external diver survey will be completed and the divers will assist

RW2 in detaching from the spreader assembly. The lifting bar will be recovered, leaving the spreader assembly suspended over Ehime Maru. RW2 will then commence demobilization. After the vessel has remained stable for 48 hours, the internal diving will commence. At any time that the vessel shifts, or otherwise exhibits any indication of instability, diving operations will cease until stability is re-established.

Phase V – Post-lift ROV Survey

As soon as practically possible following the lift of Ehime Maru, a visual survey of the sea floor where the vessel originally laid will be conducted. The purpose of the survey will be to ensure that all items of interest have been collected from the site. The survey will be accomplished with SUPSALV's ROV, DEEP DRONE.

The survey will cover a search grid of approximately 1000 meters by 1000 meters and will be centered on the area where Ehime Maru originally sat. The survey will consist of parallel and overlapping search runs with the entire grid being visually inspected. The visual survey will be limited to the 1000-meter square box unless the inspection warrants expanding the grid. This is deemed reasonable since a thorough visual and side scan sonar search outside of this box was conducted during the initial search and recovery effort. A video tape will be made of the entire search for documentation purposes.

The recovery of any remaining personal effects will be accomplished with the ROV manipulators and a collection basket. Recovered items will be placed in the basket and subsequently brought to the surface utilizing the ROV's drop hook. All personal effects will then be inventoried, washed with fresh water, bagged, and immediately turned over to the Japanese Consulate. In addition to the recovery of personal effects, any remaining items that pose a future danger (i.e., fishing nets, hooks, etc.) will also be recovered.

The Government of Japan (GOJ) has expressed an interest in possibly providing a Japanese owned and operated ROV for the post-lift inspection. If the GOJ does pursue this option and depending on the capabilities of the ROV utilized, then use of a USN asset may not be necessary.

Phase VI - Crewmember Recovery

U.S. Navy diving personnel will be augmented by SRF Yokosuka Japanese Divers. The SRF Yokosuka Japanese divers are already under OPNAV waiver to use U.S. Military diving equipment on a U.S. Navy dive station. Four SRF Yokosuka Japanese divers will be requested to support the mission, allowing two per shift. While one Japanese diver is in the water, the other will be at the communications console. Other than diving, they will be able to identify spaces through the diver's camera topside monitor. These divers will be a major part of the salvage through diving and topside support. They will not count as part of the minimum dive team requirements since they will be performing other duties when not diving.

Per the U.S. Navy Diving Manual, a minimum of eight divers is required to operate a surface-supplied diving side using more than one diver. This operation will require two diving systems in use for a minimum of 16 divers per shift. This does not include the personnel required for decontamination, chamber surface-decompression, stage handling, topside camera systems, winch operators, medical personnel, etc.

The estimated 30 meters of water will put divers on a Surface Decompression Table using Oxygen between 30m to 35m depending on actual depth at final rest. Some dives will be less than 30 meters when divers are working in upper decks. Based on this, divers will have between 60 and 90 minutes of bottom time with less than 15 minutes of in-water decompression. With quick turn around times, the maximum amount of dives possible in a 12-hour shift is six. Using three divers per dive, this would require 18 divers per shift. The intention is to use two shifts to support 24-hour diving operations.

Discussion of Methodology of Entering, Inspecting and Documenting all Compartments.

Entering. The third deck is the deepest deck on the Ehime Maru. This deck has the engine room, student mess room, refrigerator store room, etc. Three divers will be used when entering this third deck. Red diver will enter the second deck through passageways accessible on the first deck and will be tended until he is at the ladder or opening to the third deck. Green diver will proceed into the second deck to meet up with Red diver while being tended by Yellow diver. Red diver will then proceed to the third deck while being tended by Green diver. Yellow diver will tend Green diver.

Inspecting, Recovering, and Documenting. The initial inspection will be conducted on last known location of the sailors. Remains and personnel affects encountered will be collected and removed to the surface. If all remains are not recovered during this search, an extensive search of every space will be conducted and documented on video tape. The entry to each space will be clearly marked and numbered. The diver will enter the space and perform a thorough search of the entire space. The helmet mounted camera and light system will be connected to a topside video recorder and monitor. The Diving Supervisor, the SRF Japanese diver, as well as Japanese VIPs can observe the entire search topside through this monitor. The ship's drawing topside will be marked as the divers complete each inspection. A space is completely searched when topside personnel are satisfied that there are no remains in that space. Operations will continue until all victims have been found or all spaces have been thoroughly searched with video documentation.

Details of Support Platform to be Used. NAVSEA will contract with Crowley Marine for the diving support barge CMC 450-10. This barge will be used as a dive platform during the recovery phase and then used as the lift platform for at-sea disposal. The 120 meter long by 30 meter wide barge has power, water, galley, mooring gear, cranes, and berthing for 80 personnel. The barge will be outfitted with mortuary facilities and appropriate personnel to handle crewmember remains. The barge will be moored and supported with the assistance of a commercial tug contracted by NAVSEA.

Type of Diving Used With Number of Chambers Required. Surface Decompression using Oxygen will be used for decompressing the divers. This will allow for minimum time spent in the water with the majority of decompression conducted topside in a recompression chamber under a controlled atmosphere. Two chambers will be used for the operation. A Transportable Recompression Chamber System (TRCS) will be used for the Surface Decompression and a Fly Away Diving System (FADS) Dixie Double Lock chamber will be used for treatment of Arterial Gas Embolism (AGE) or Decompression Sickness (DCS).

Remediation Effort During Crewmember Recovery Phase. During the crewmember recovery phase, NAVSEA will provide personnel and equipment to ensure that the environment is protected by performing periodic surveillance over flights. Additionally, we will maintain one vessel-mounted dispersant spray system on site. One skimmer system will be located on site for the initial survey period and retained as required. A second skimmer system will be in ready standby at Pearl Harbor. Two helicopter dispersant bucket systems will be retained in ready standby in Honolulu.

Timeline. The planned duration for the recovery phase is 30 days. This phase includes load out, mooring, bad weather days, and a full stem-to-stern inspection and video documentation. The length of this phase can be reduced if all crewmembers are found early. As mentioned in Phase IV, diving operations will not start inside the hull until 48 hours after returning Ehime Maru to the ocean floor. This initial time will be utilized to perform external inspections of the condition of the vessel.

Phase VII – Preparation and Disposal of Ehime Maru at Deep Water Site.

Once the dive team completes operations, Ehime Maru will be lifted back off the seafloor and taken to a deep water disposal site. The barge that supported the diving operations will be utilized to make the lift and take Ehime Maru to her final resting place. Steps required in this phase include:

a. Preparation for Disposal. The initial task in this phase is to remove the fuel and lube oil from Ehime Maru to prepare for ocean disposal. Depending on the condition and integrity of the tanks and tank vents, it is likely that tank access from inside the hull would be required, particularly for the lube oil tanks, in order to remove as much remaining oil as possible. Oil released from damaged tanks and trapped in other vessel spaces would be difficult to detect and recover. Even proper access to tanks containing oil would not ensure complete oil removal, as oil trapped by buoyant forces against the tanks internal strength members would not flow to the tank access point. Offloading oil from the submerged vessel following appropriate rigging by divers is feasible, however, it is unlikely that all remaining oil would be removed. A method for offloading oil would utilize divers to access tanks through vents and pumping to the support barge. Alternately, a hot tap system can be used to access tanks through tank tops and sides to increase accessibility. A detailed plan will be developed for oil removal during the planning and engineering phases of the operation. However, based on the condition of the tanks and piping on Ehime Maru, it may be prudent not to attempt fuel removal as it may increase the risk of environmental damage at the near shore site.

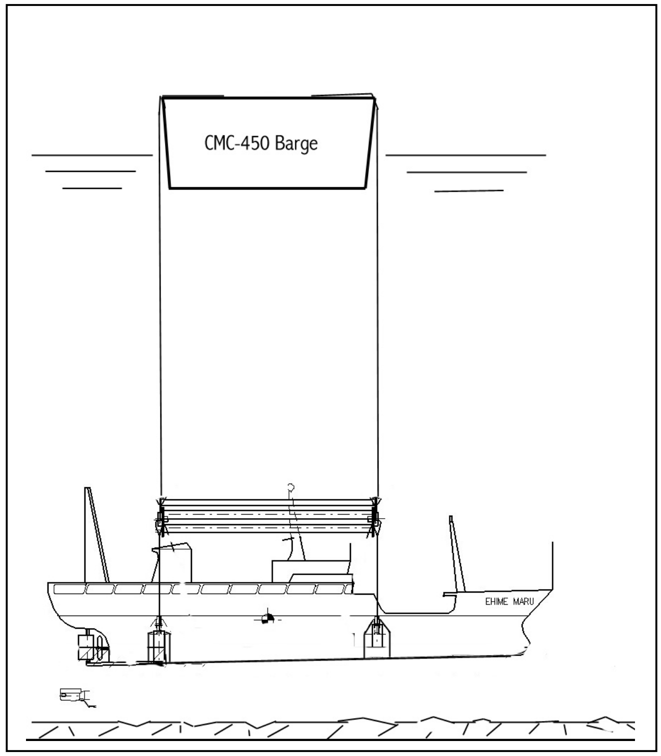


Figure 12 – Barge Lift and Transit to Disposal Site

b. Method for Reattachment. The barge will ballast down approximately 4.5 meters while moored directly over EM. The lifting beam will be lowered back to the spreader assembly, this time utilizing 100mm, Grade 3 chain instead of wire rope. Divers will attach the lifting beam to the spreader assembly and do a final inspection to insure that all rigging is still in place. See Figure 12.

c. Lift from Sea Floor. Once divers are clear of the water and conditions are acceptable, the slack will be taken out of the lifting chains using deck winches and wire rope. Once all slack is out of the chains, the barge will be deballasted to return to its original draft. This will lift Ehime Maru clear of the sea floor for transit to deep water.

d. Transit to the Disposal Site. Two tugs will be used to tow the barge/ Ehime Maru to the disposal site, following the surveyed route. One tug will tow, while the other is connected to the stern of the barge to maintain constant drag for control. A maximum speed of one knot will be maintained.

e. Sinking at the Disposal Site. Navy divers will flood the spreader assembly and rig explosive cutters on the slings to release Ehime Maru from the lifting assembly. The barge will then be towed back to Pearl Harbor to demobilize the dive system and personnel, completing the operation. During this phase, NAVSEA will provide periodic surveillance over flights to detect any spill. A skimmer system be retained on site during the entire oil removal process and will accompany the vessel to ten miles offshore. A second skimmer system will be retained in ready standby at Pearl Harbor throughout the process. Two helicopter dispersant bucket systems will be in ready standby in Honolulu and full logistic support will be provided.

APPENDIX H
PLUME MODELS

APPENDIX H
PLUME MODELS

Prior to the initiation of recovery activities, the National Oceanic and Atmospheric Administration ran a series of oil plume trajectory analyses (2001a) to model the behavior of an uncontained diesel fuel release at the shallow-water recovery sites. Several variables were factored into the models before they were run, including release location, wind direction, time period, and tide conditions (ebb or flood). Constants included the wind speed (10 knots [20 kilometers per hour]) and amount of diesel fuel released (20,000 gallons [76,000 liters]). A wind speed of 10 knots [20 kilometers per hour] was used since this is the average wind speed recorded at the Honolulu International Airport in August over the last 10 years (National Climatic Data Center, 2001). Twenty-thousand gallons (76,000 liters) was used because this was considered to be the most credible amount of diesel fuel that would be released. The models were run as if the release had occurred instantaneously as opposed to occurring over a period of time. This model has a 90% confidence limit, meaning there is a 90% probability the diesel fuel will be within the confidence limit shown on the plots of the diesel fuel plumes.

Analyses were run for every candidate shallow-water recovery site. At the Reef Runway site, the time period for every analysis was 24 hours. The plots show that winds from the east would result in diesel fuel being pushed toward the beach at Barbers Point during both ebb and flood tide conditions. Winds from the east/northeast could potentially result in diesel fuel being pushed toward the beach during both ebb and flood tidal conditions; however, it appeared to be much more likely during flood conditions. Winds from the north and northeast would result in the plume being pushed offshore after 24 hours in all conditions.

At Ewa Beach, the trajectory analyses show that when winds are from the east, diesel plumes would be pushed toward the beach during both tidal conditions after only 12 hours. After 18 hours the plume would be pushed toward the beach up the coast north of Barbers Point. Winds from the east/northeast would push the plume close to the beach along Barbers Point after only 12 and 18 hours during a flood and ebb tide, respectively. Winds from the northeast would push the plume offshore after 12 hours during both tidal conditions.

At Waianae Coast, winds from the east and east/northeast would push the plume away from the coast after only 12 hours during all tidal conditions. At southwest Molokai, winds from the east would push the plume away from the coast in all tidal conditions.

Light trade wind conditions (less than 10 knots [20 kilometers per hour]) during morning hours occur relatively infrequently, however, they can serve as an indicator for an afternoon seabreeze. A seabreeze occurs when the warm air over a land mass rises and cooler air (from the ocean) moves in to replace it. During an uncontained diesel fuel or lubricating oil release, a seabreeze could potentially result in the plume being pushed directly towards shore (National Weather Service, 2001). Since this is a readily acknowledged condition, these wind conditions were not modeled.

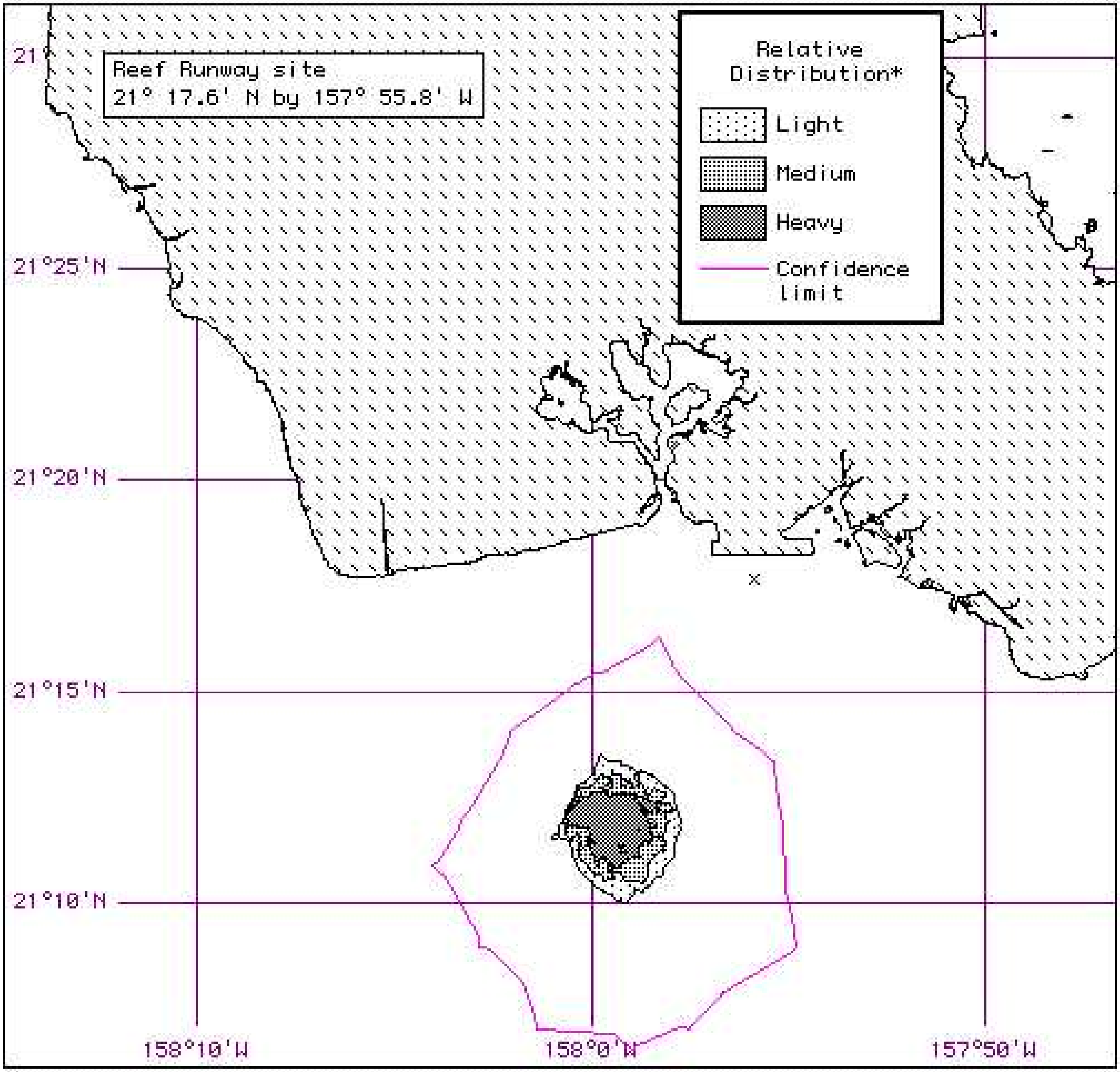
To ensure recovery operations are conducted during optimal wind and current conditions, real-time surface and subsurface current monitoring would occur. This effort would be facilitated by placing data buoys at the edge of the coral fringe 2 to 3 nautical miles (4 to 6 kilometers) from the shallow-water recovery site, and at the shallow-water recovery site to monitor wind speed and direction, air temperature, current speed in the water column, and wave height and period. These buoys would be in place approximately 30 days prior to the start of recovery operations and would help ensure that recovery operations that could potentially result in a diesel fuel or lubricating oil release would only take place during the most favorable weather conditions for containing a release.

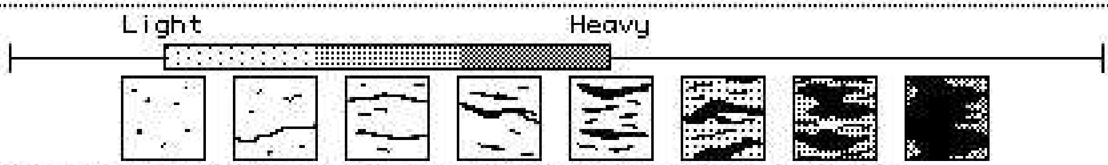
Reef Runway Site **HAZMAT Trajectory Analysis**

Estimate for: 24 hrs, 8/19/0

Prepared: 1516, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from N at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





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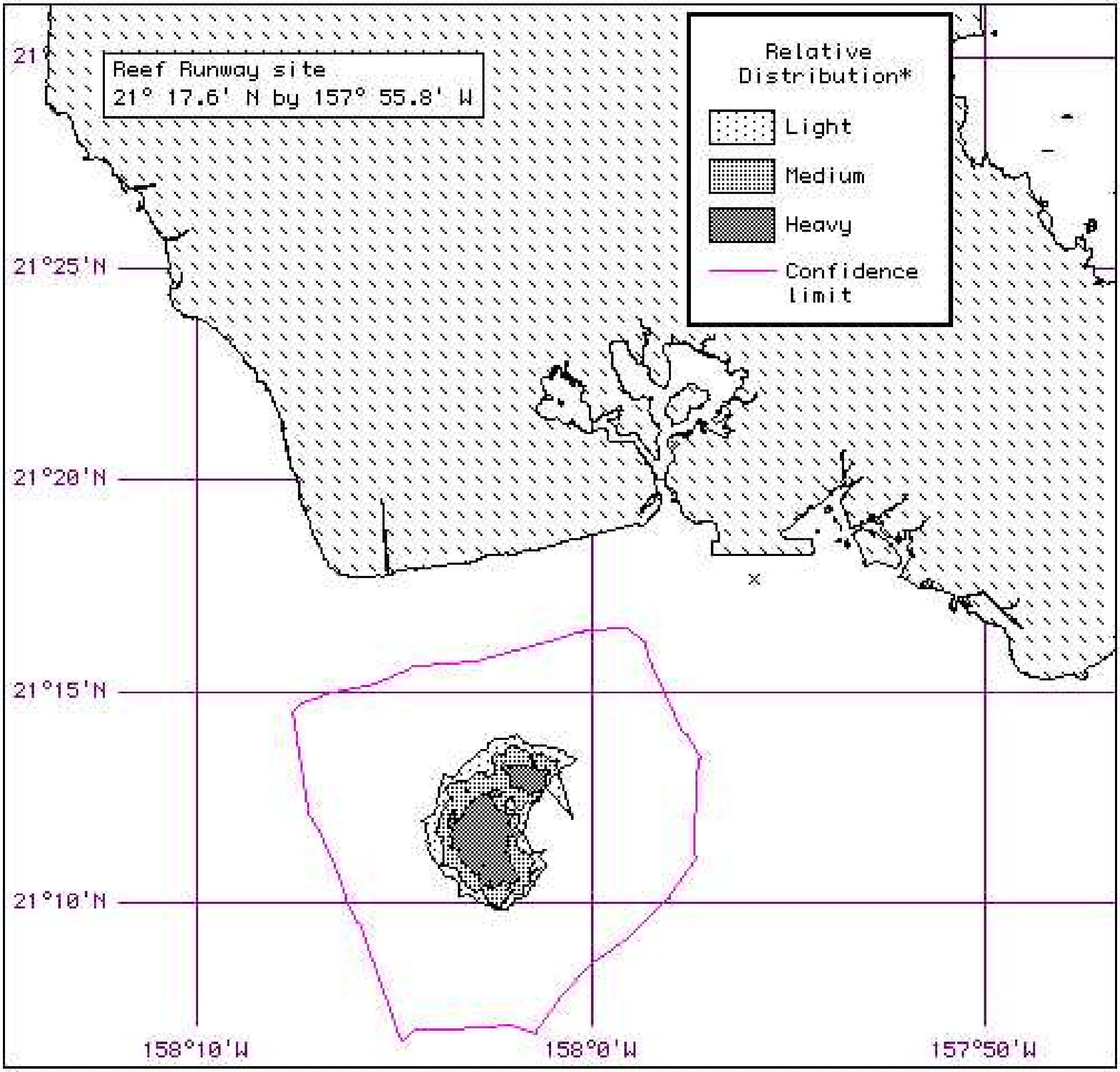
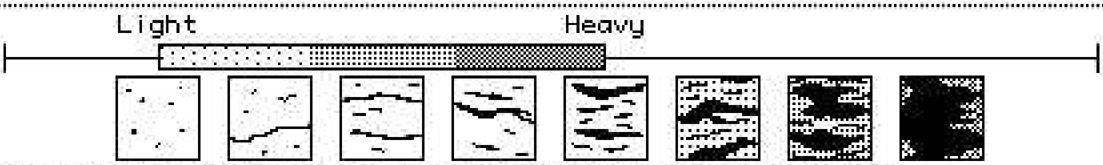
Reef Runway Site **HAZMAT Trajectory Analysis**

Estimate for: 24 hrs

Prepared: 1516, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from N at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously





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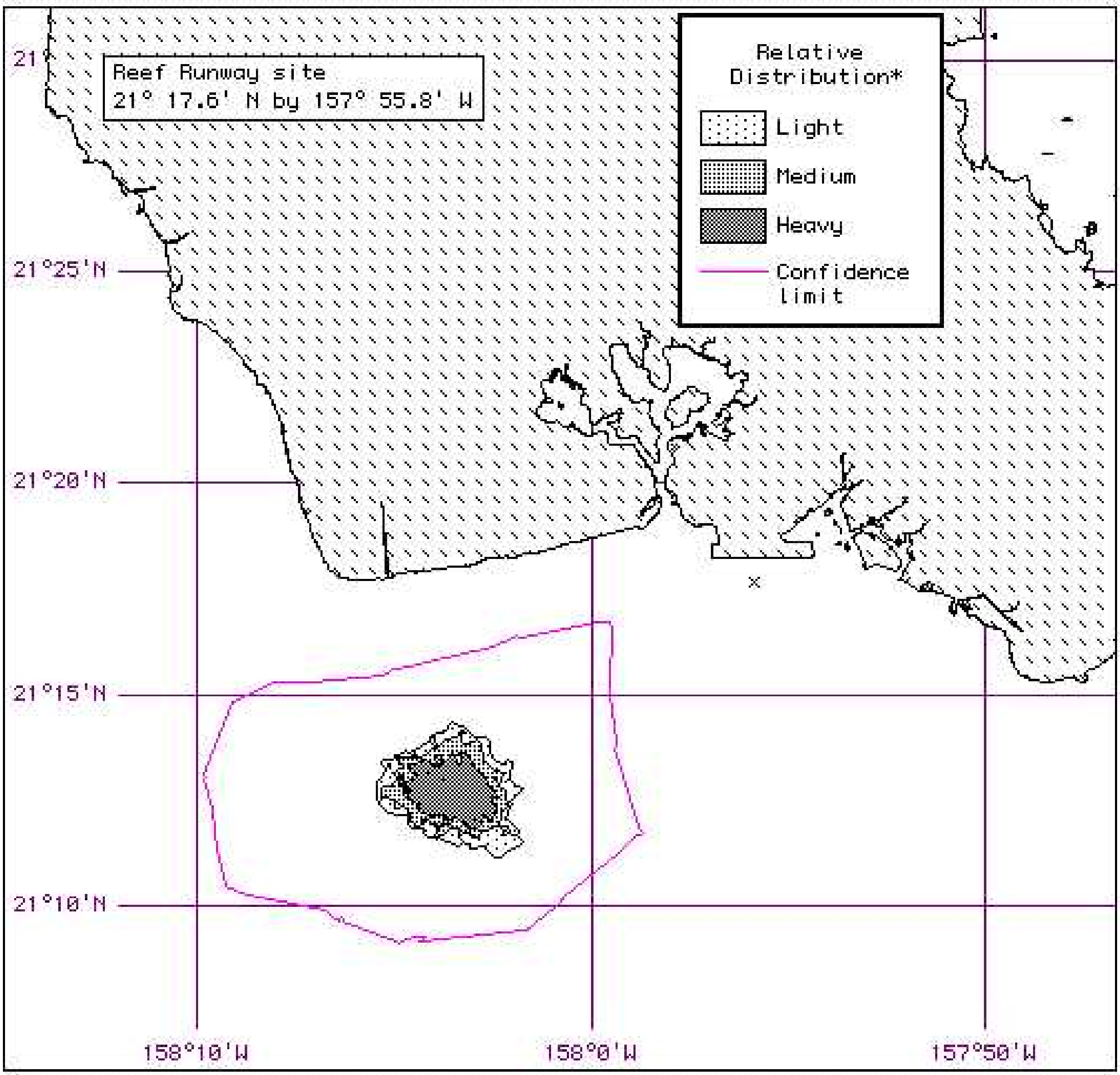
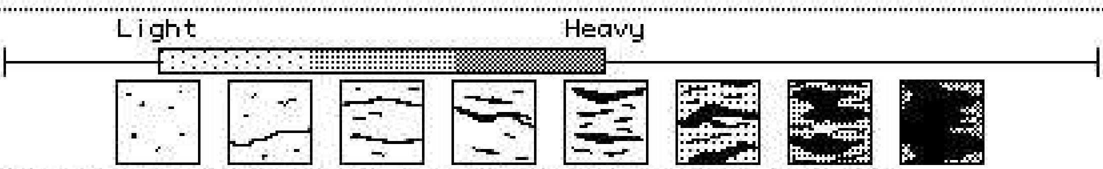
Reef Runway Site **HAZMAT Trajectory Analysis**

Estimate for: 24 hrs

Prepared: 1516, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from NE at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





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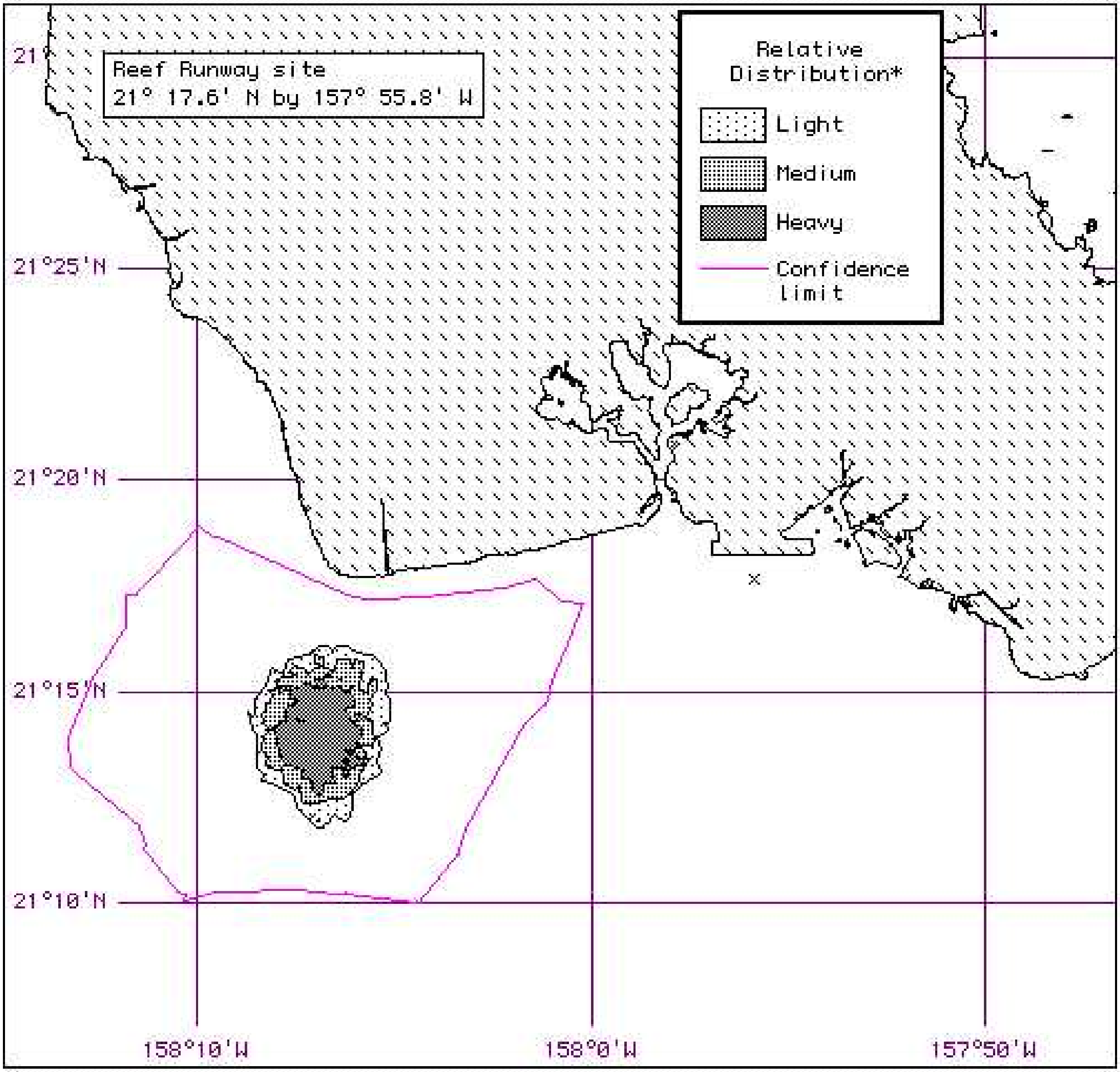
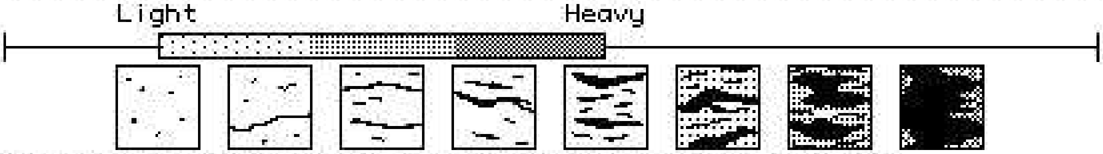
Reef Runway Site | **HAZMAT Trajectory Analysis**

Estimate for: 24 hrs

Prepared: 1516, 5/8/01 | NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from NE at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously





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Reef Runway Site **HAZMAT Trajectory Analysis**

Estimate for: 24 hrs

Prepared: 1516, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
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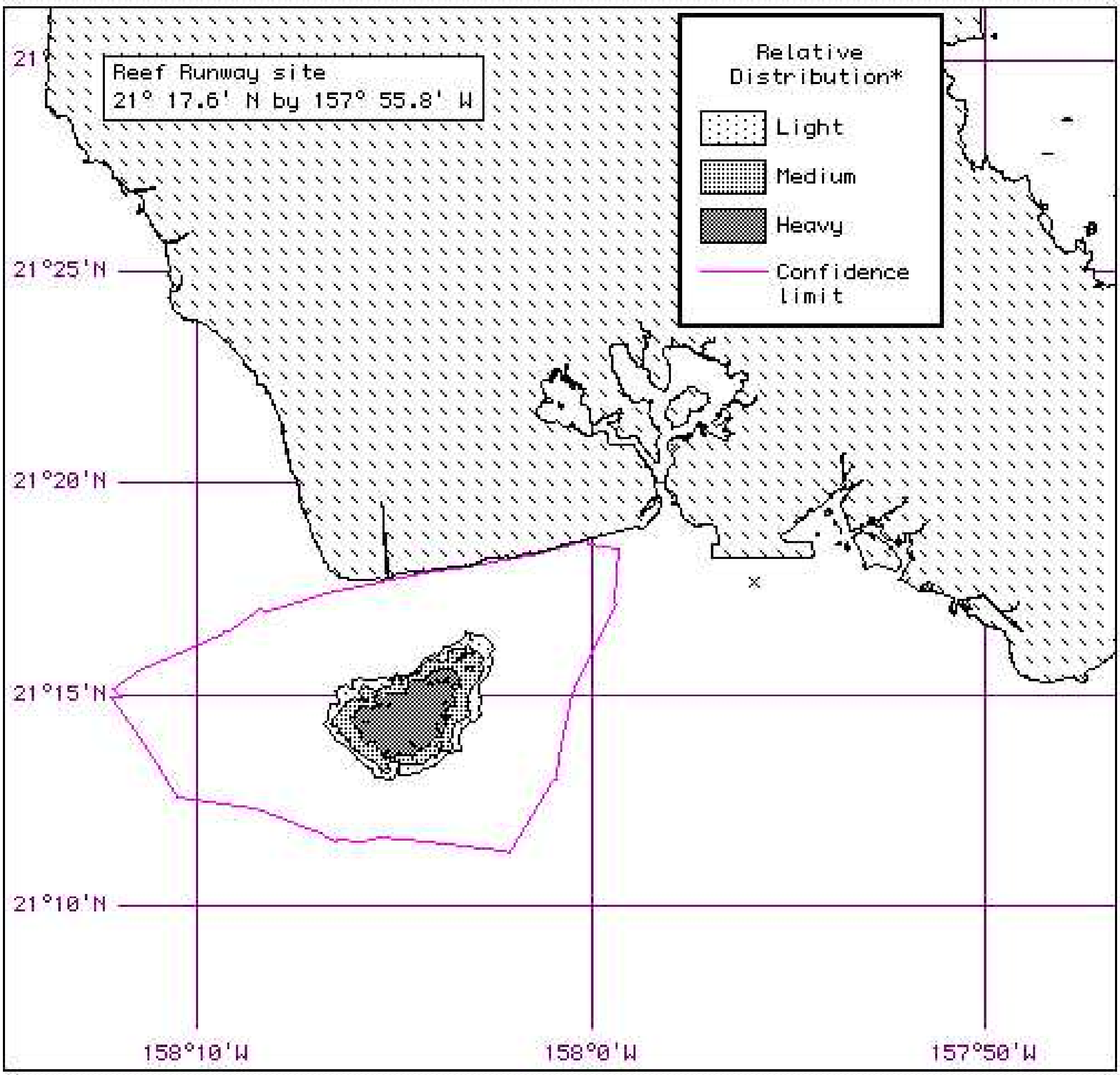
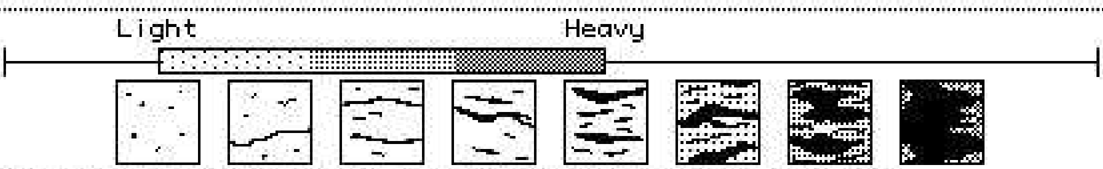
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





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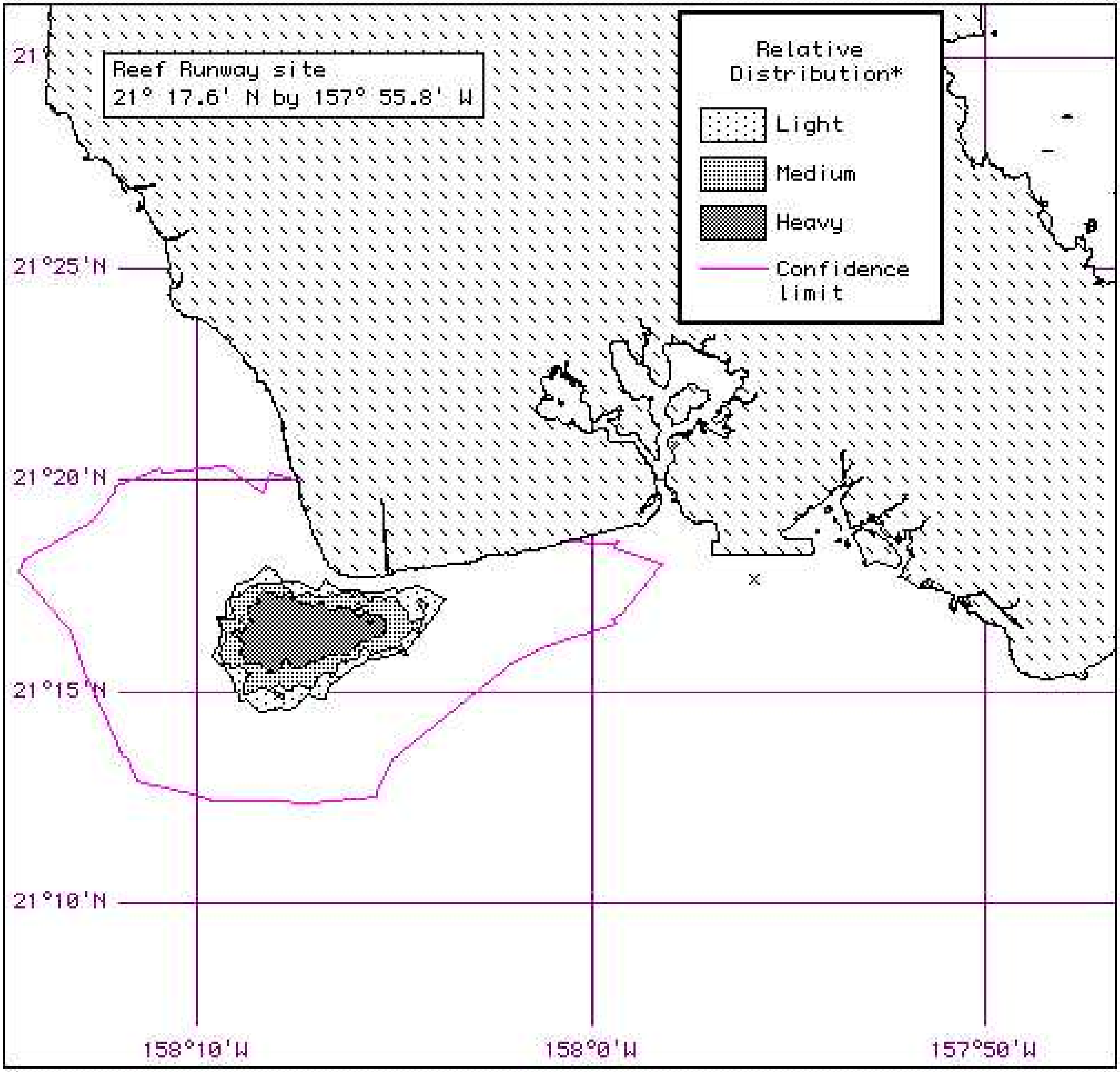
Reef Runway Site **HAZMAT Trajectory Analysis**

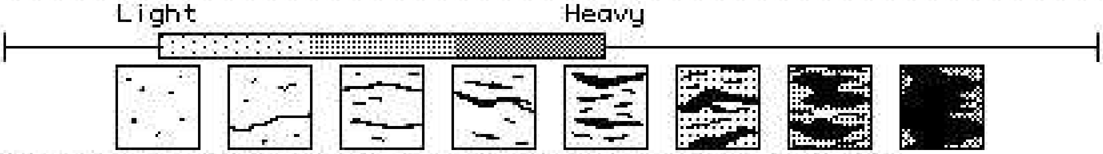
Estimate for: 24 hrs, 8/19/0

Prepared: 1516, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from ENE at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously



Light Heavy



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Reef Runway Site

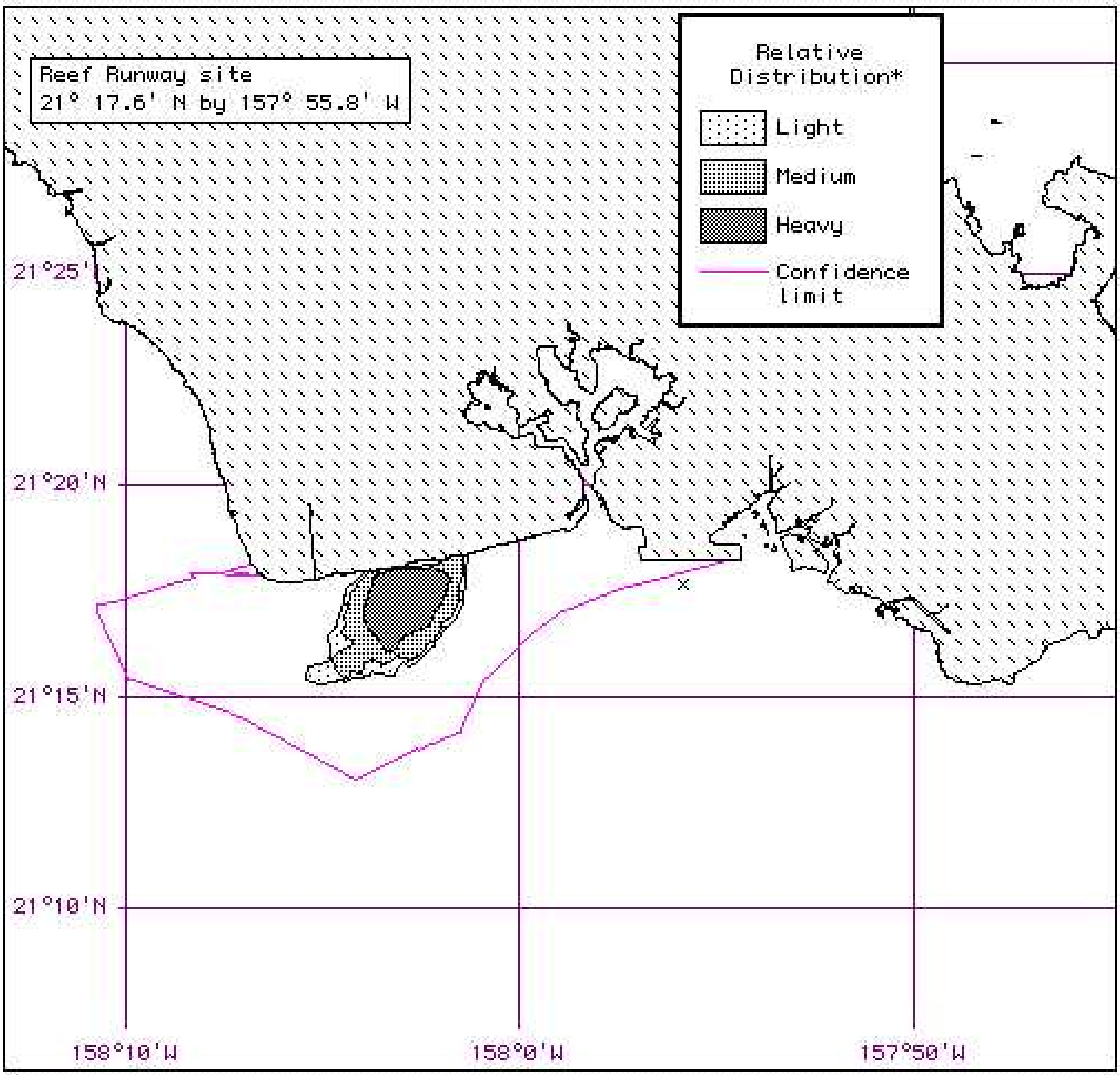
HAZMAT Trajectory Analysis

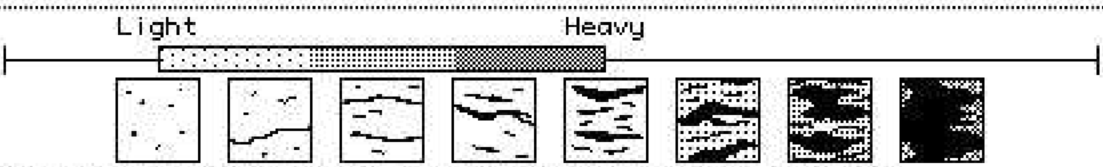
Estimate for: 24 hrs, 8/19/0

Prepared: 1516, 5/8/01

NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from E at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





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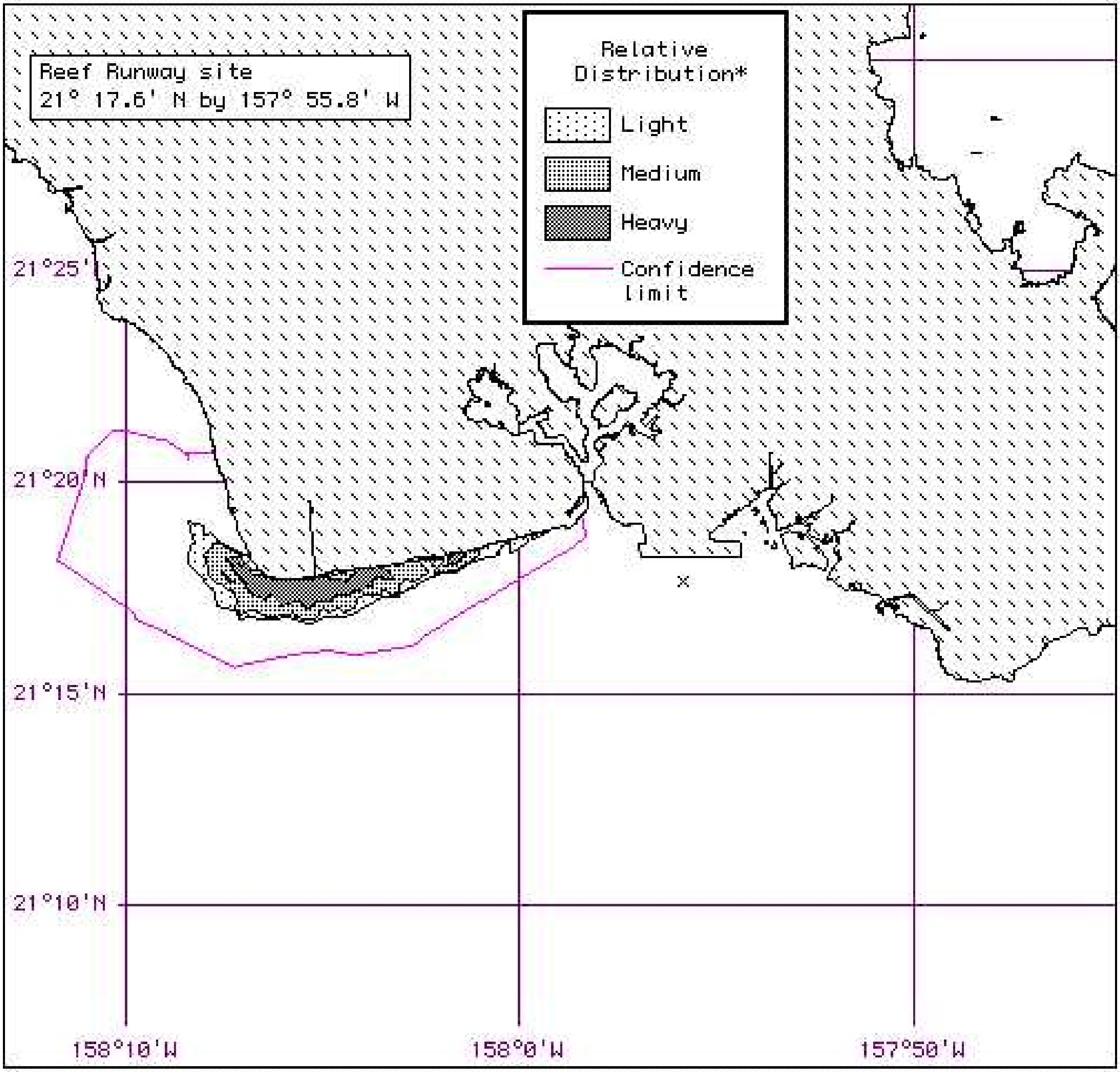
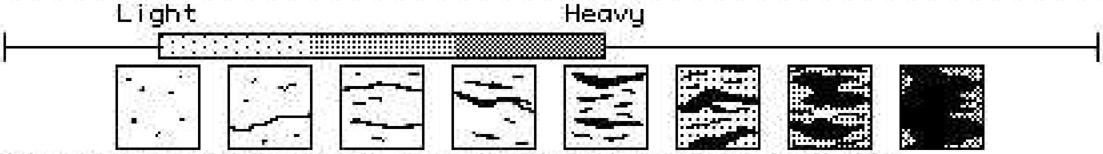
Reef Runway Site **HAZMAT Trajectory Analysis**

Estimate for: 24 hrs

Prepared: 1516, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from E at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously





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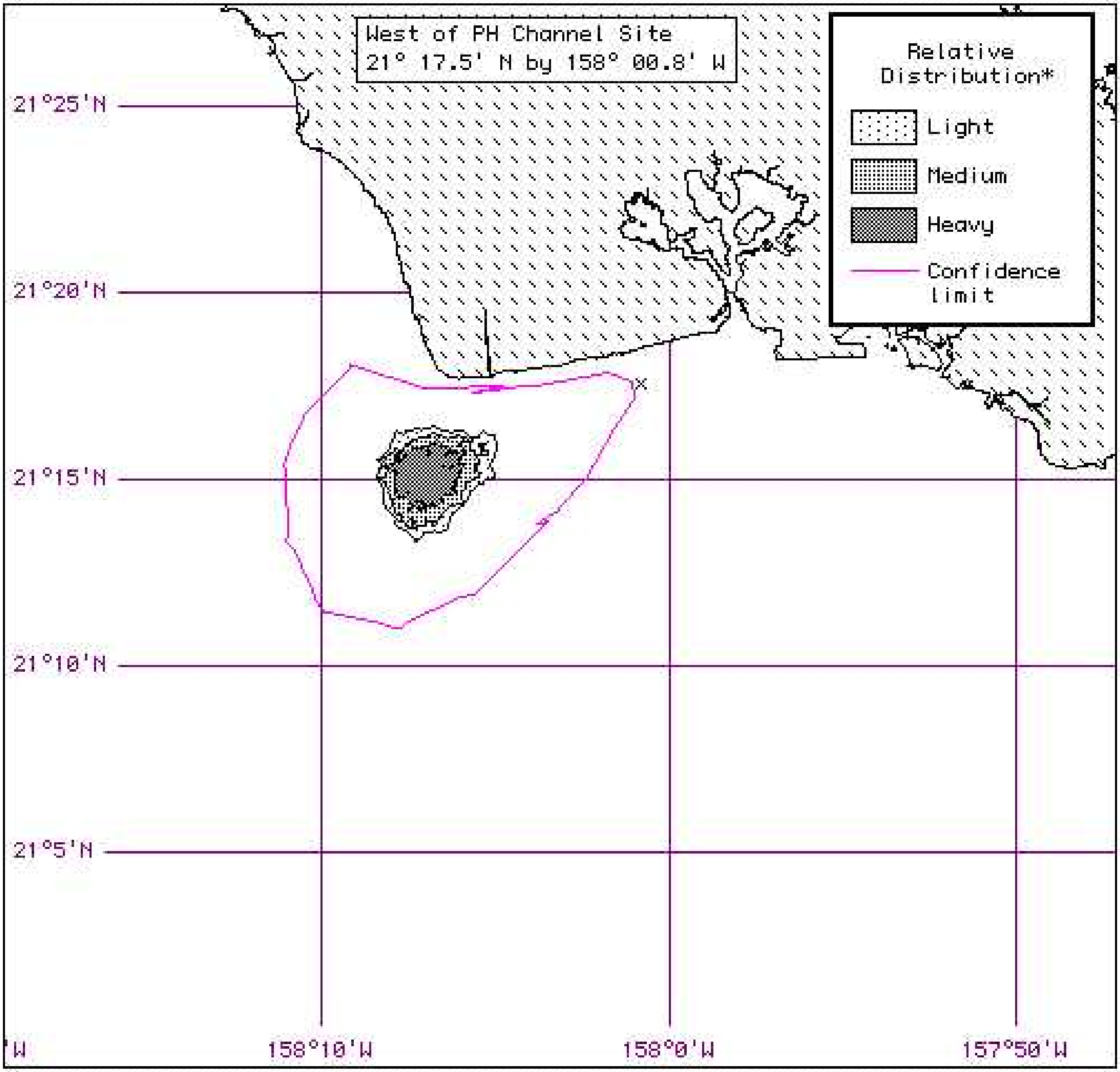
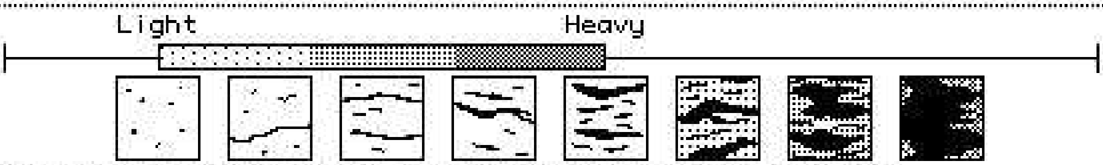
West of PH Channel **HAZMAT Trajectory Analysis**

Estimate for: 18 hrs

Prepared: 1404, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from NE at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





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West of PH Channel **HAZMAT Trajectory Analysis**

Estimate for: 12 hrs, 8/19/0

Prepared: 1404, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
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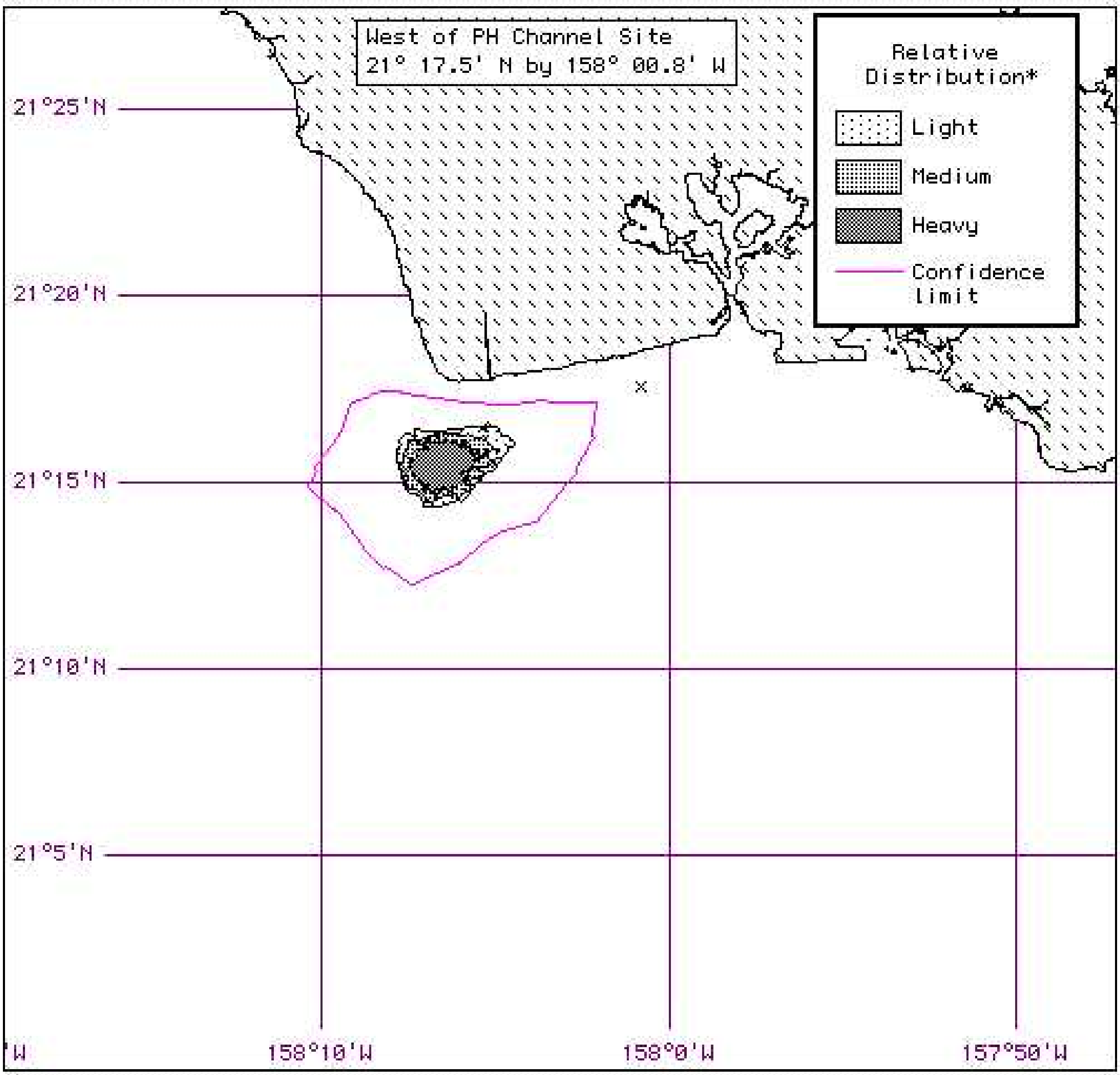
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously



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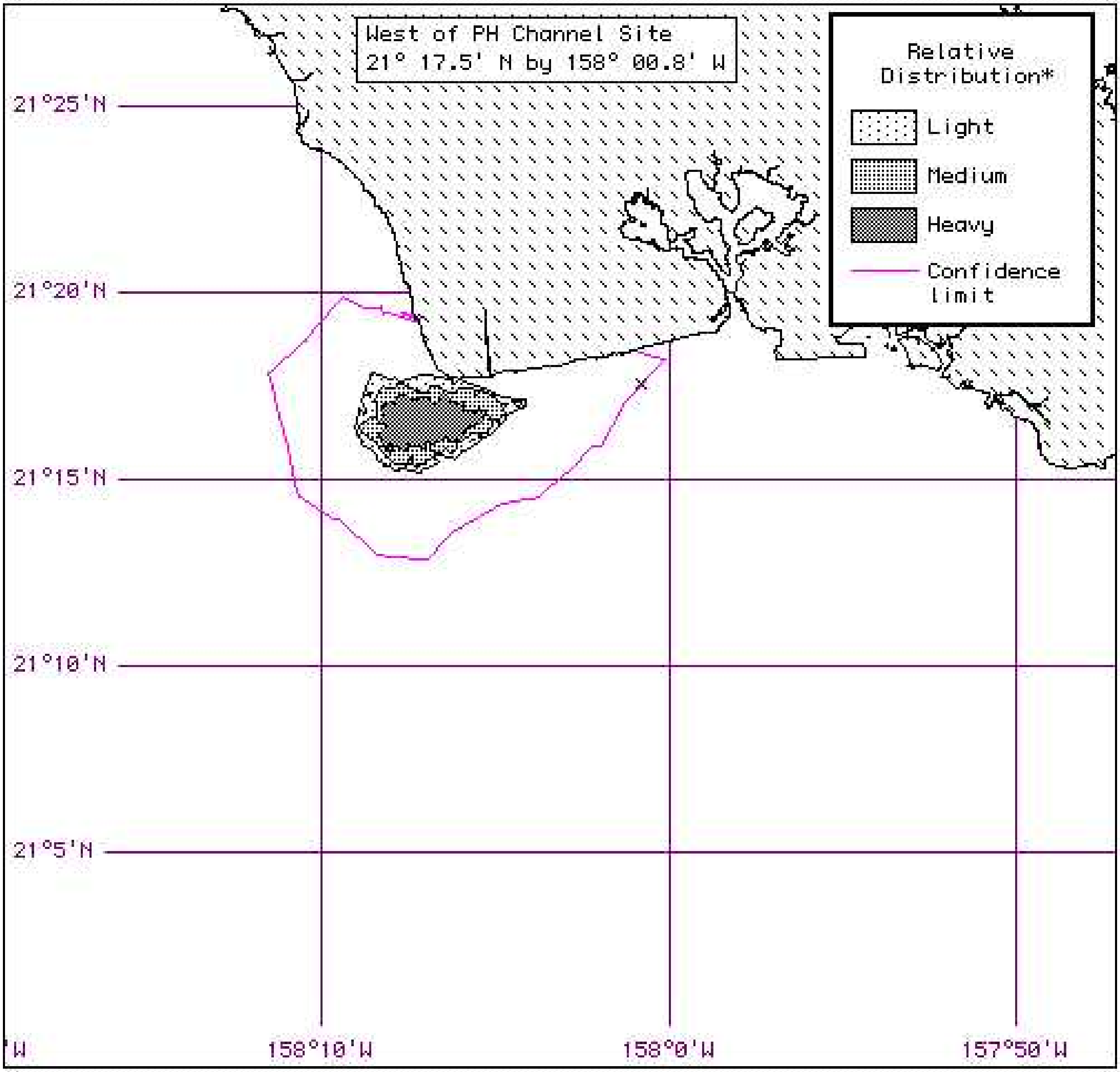
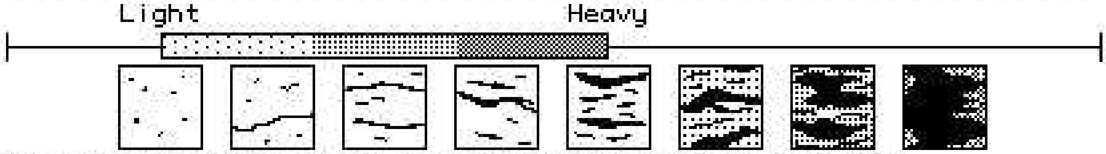
West of PH Channel **HAZMAT Trajectory Analysis**

Estimate for: 1800

Prepared: 1404, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from ENE at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





* this scale bar shows the meaning of the distribution terms at the current time

West of PH Channel

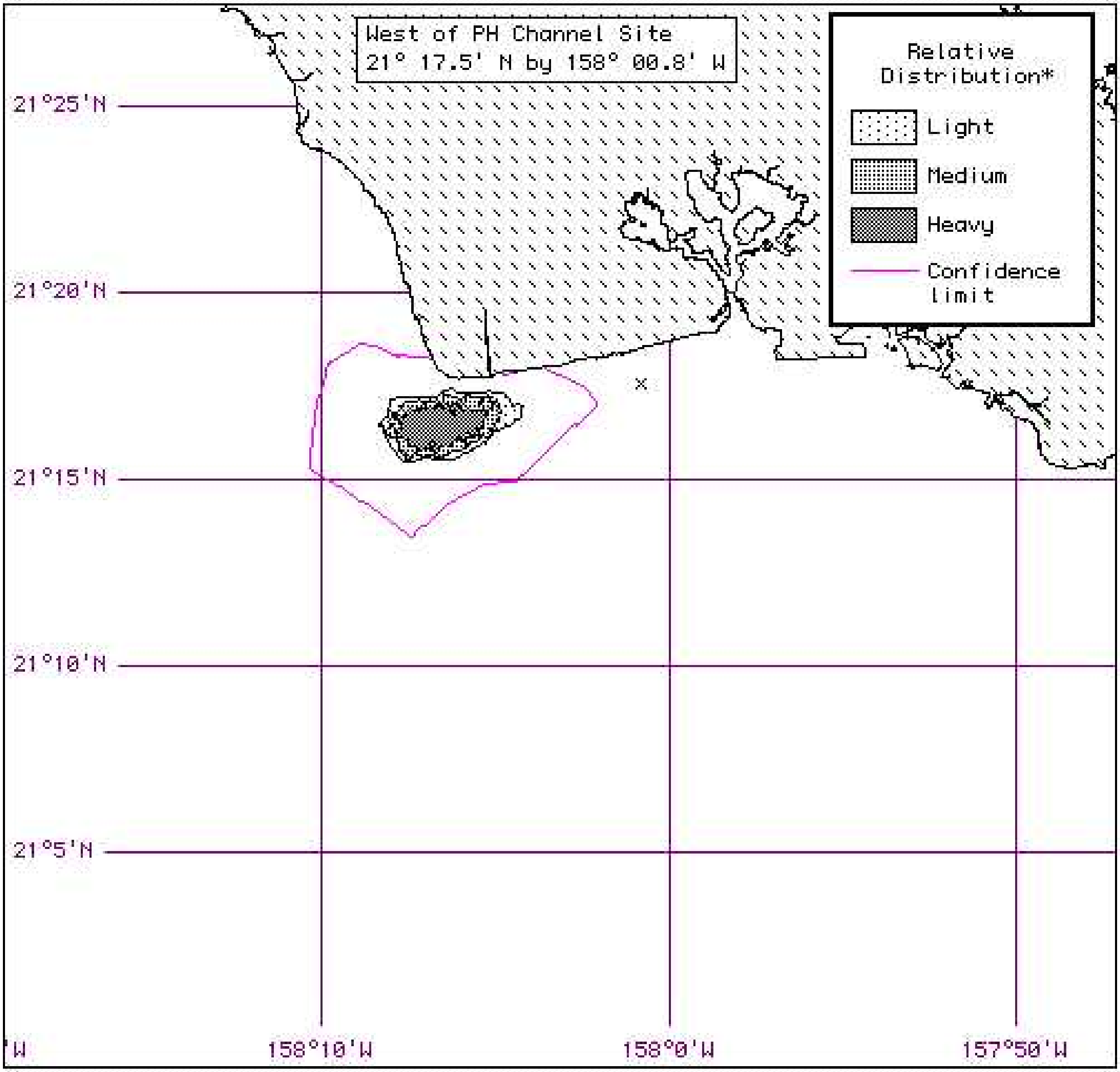
HAZMAT Trajectory Analysis

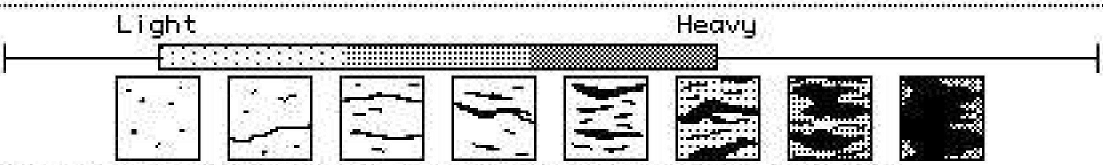
Estimate for: 12 hrs

Prepared: 1404, 5/8/01

NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from ENE at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously





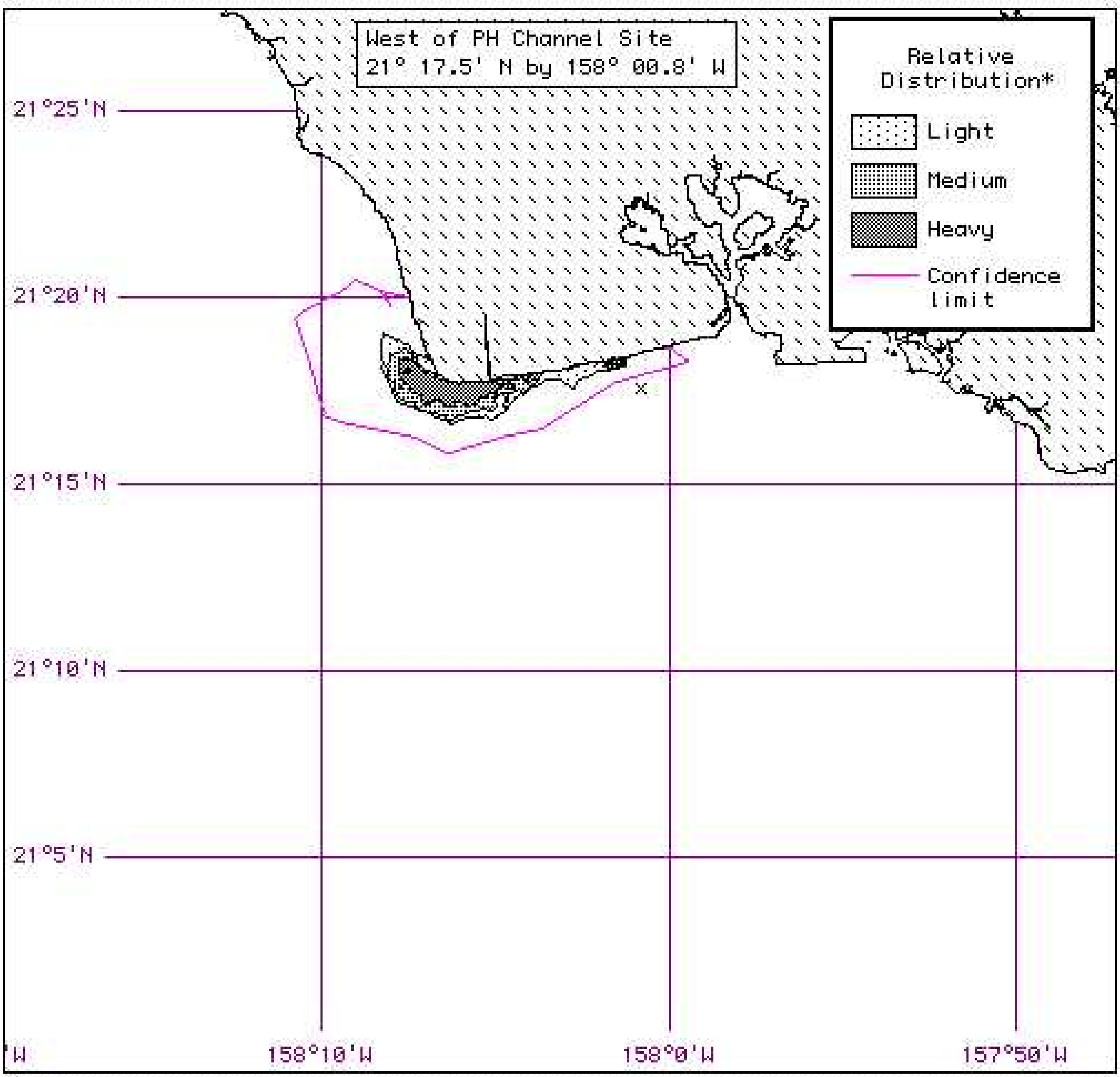
* this scale bar shows the meaning of the distribution terms at the current time

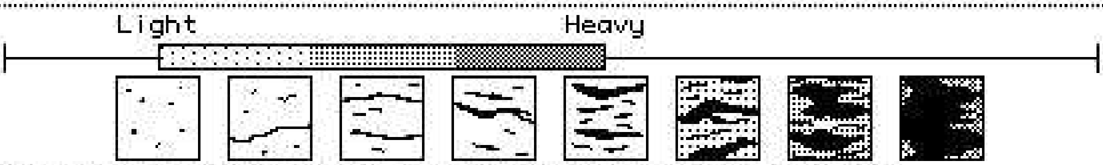
West of PH Channel **HAZMAT Trajectory Analysis**

Estimate for: 18 hrs

Prepared: 1404, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from E at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





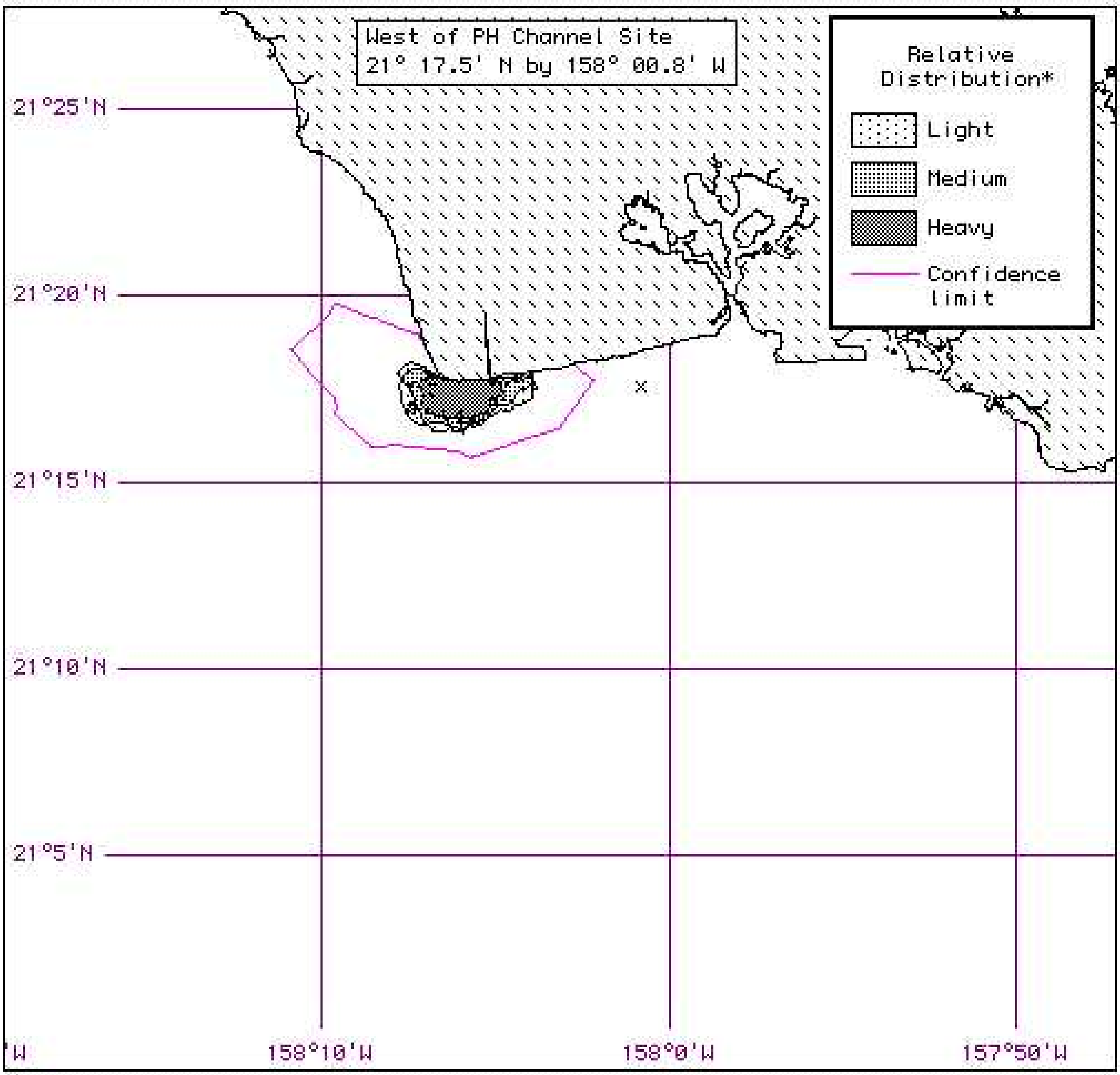
* this scale bar shows the meaning of the distribution terms at the current time

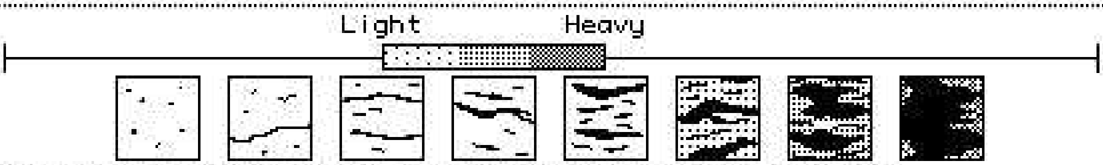
West of PH Channel **HAZMAT Trajectory Analysis**

Estimate for: 12 hrs

Prepared: 1404, 5/8/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from E at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously





* this scale bar shows the meaning of the distribution terms at the current time

Waianae Coast

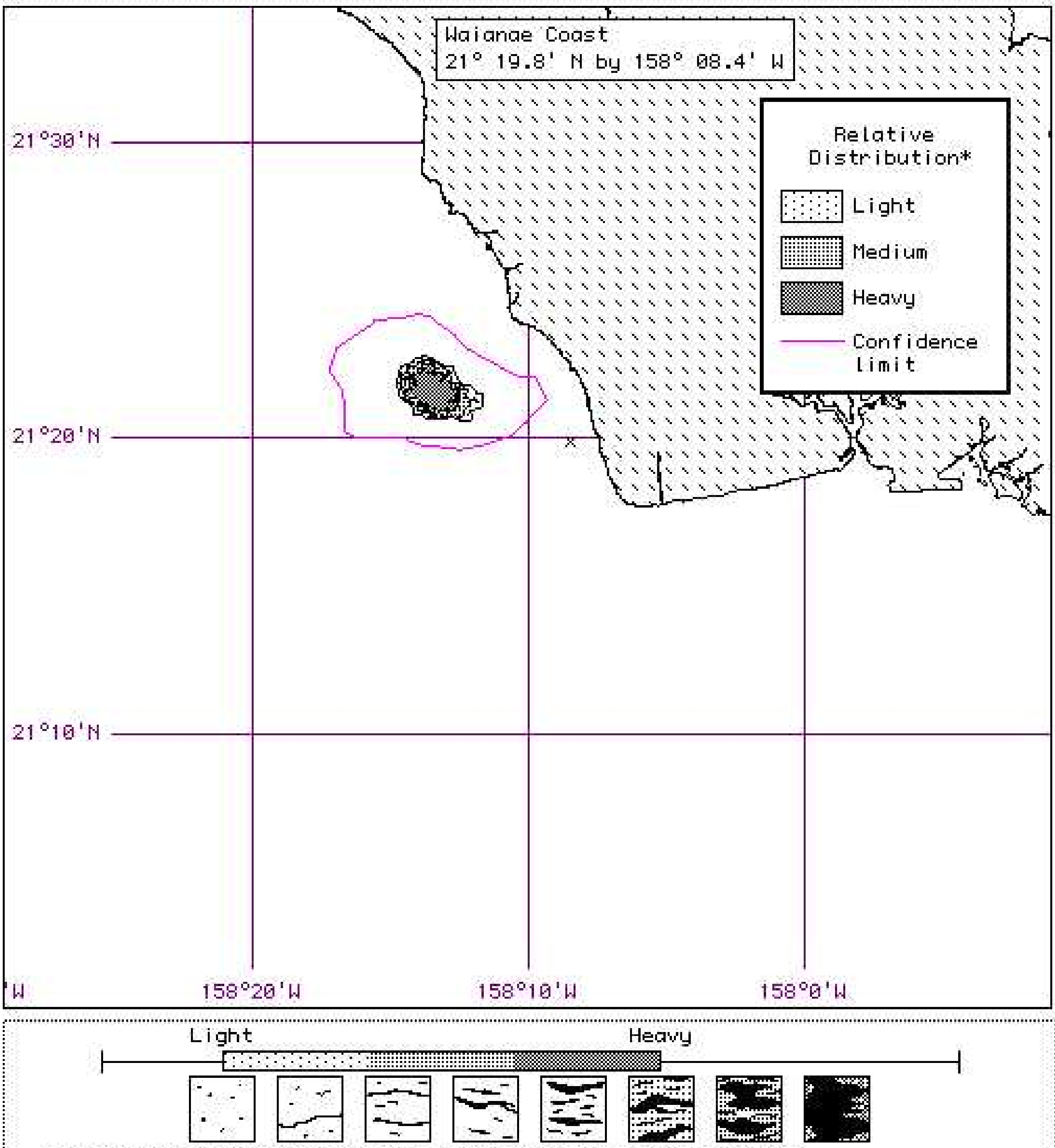
Estimate for: 12 hrs

Prepared: 1015, 5/10/01

HAZMAT Trajectory Analysis

NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from ENE at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously



* this scale bar shows the meaning of the distribution terms at the current time

Waianae Coast

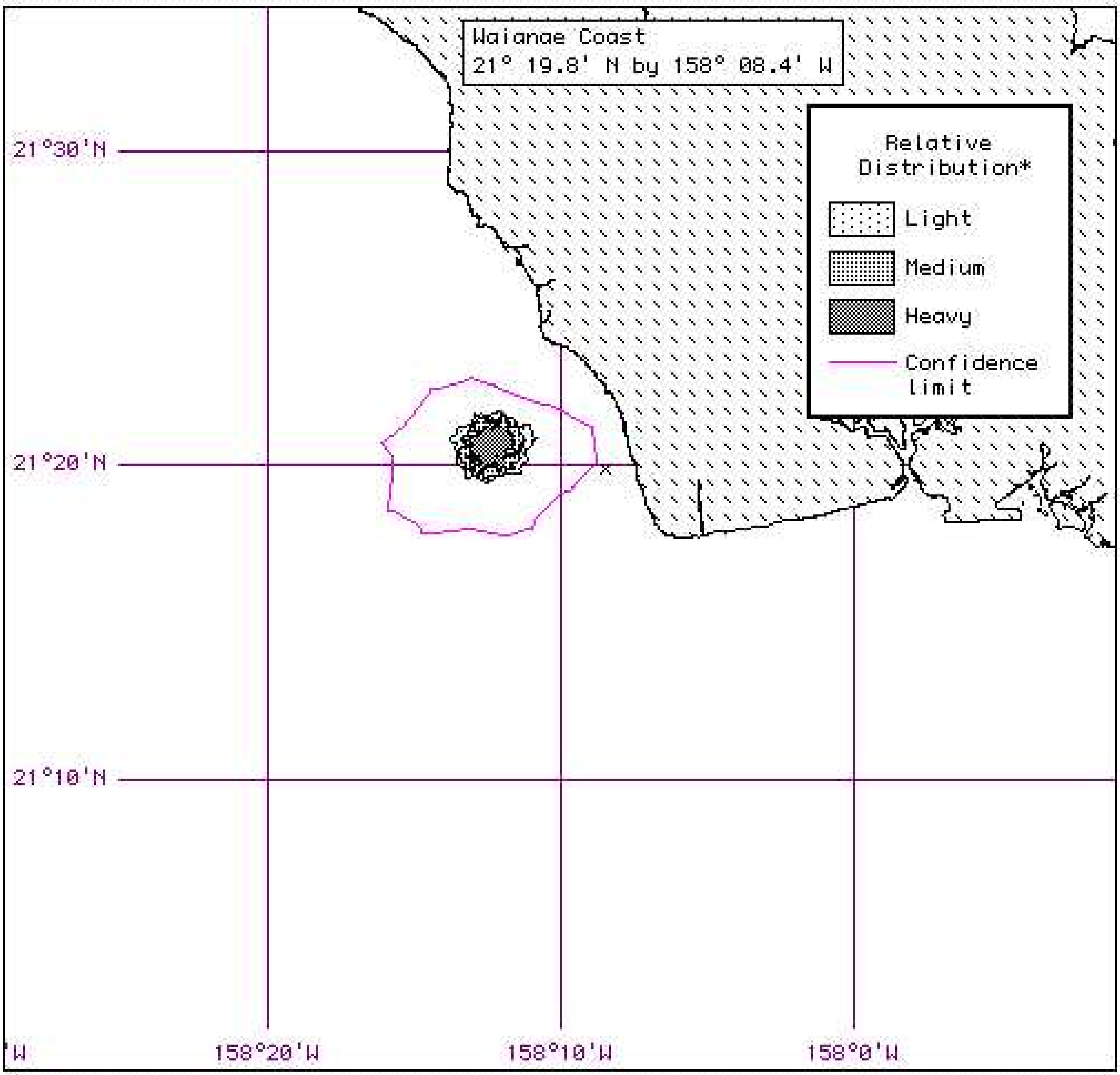
Estimate for: 0700, 8/19/01

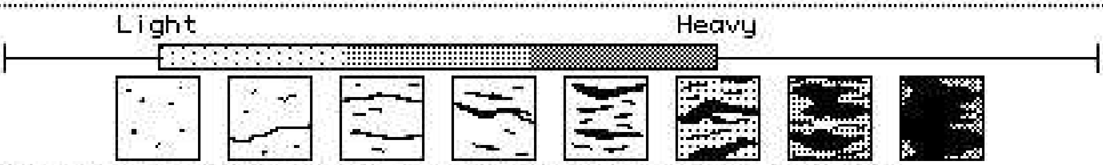
Prepared: 1015, 5/10/01

HAZMAT Trajectory Analysis

NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from ENE at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously





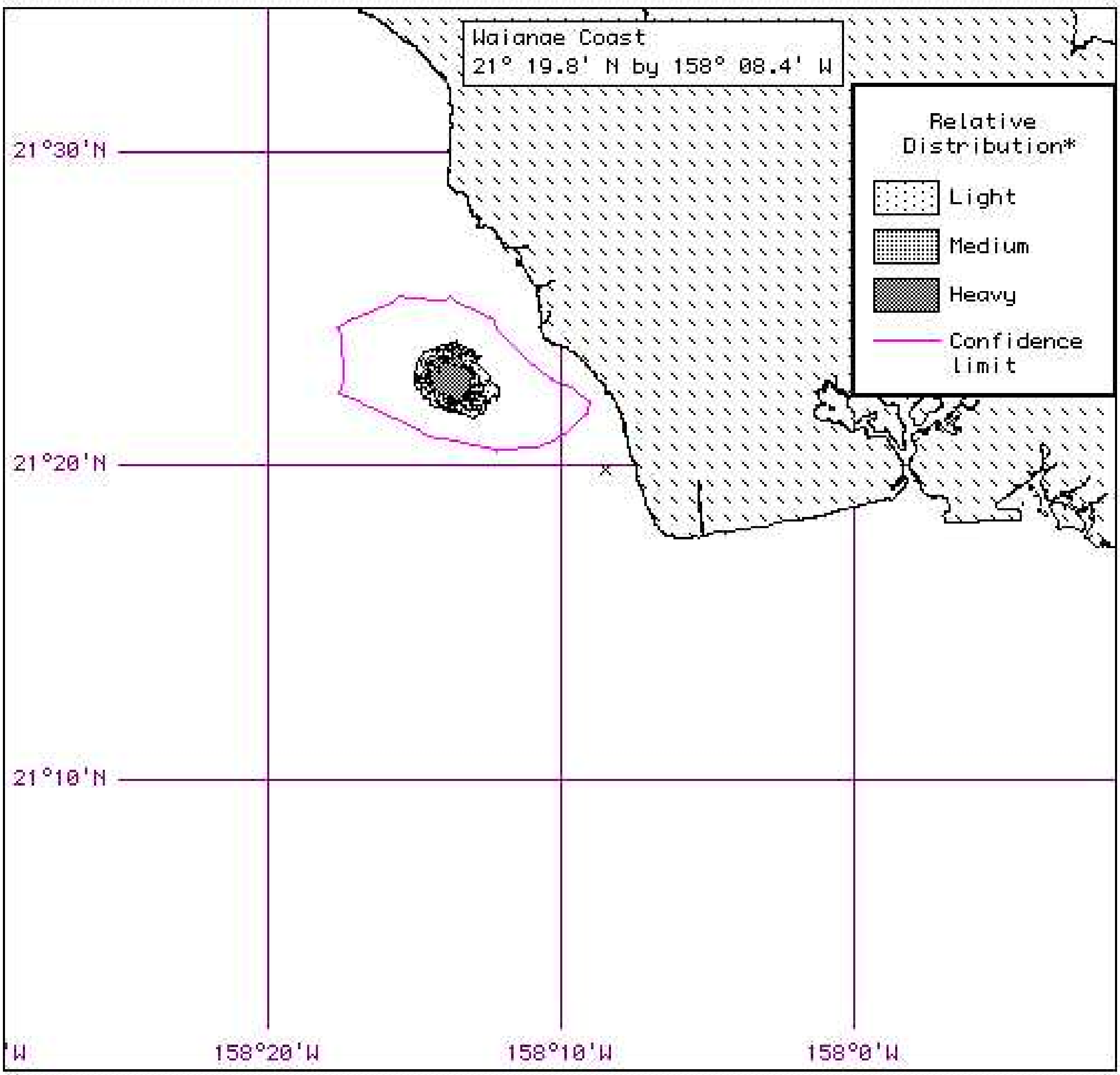
* this scale bar shows the meaning of the distribution terms at the current time

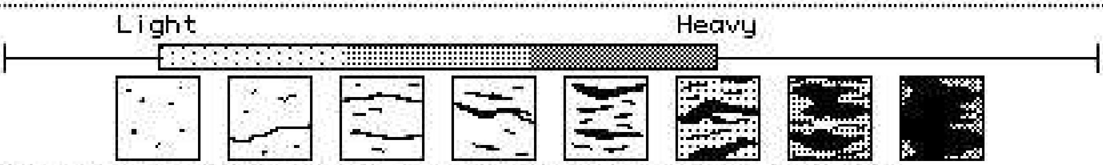
Waianae Coast **HAZMAT Trajectory Analysis**

Estimate for: 12 hrs

Prepared: 1009, 5/9/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from E at 10 knots
Spill starts at beginning of ebb tide
20,000 gallons of diesel fuel spilled instantaneously





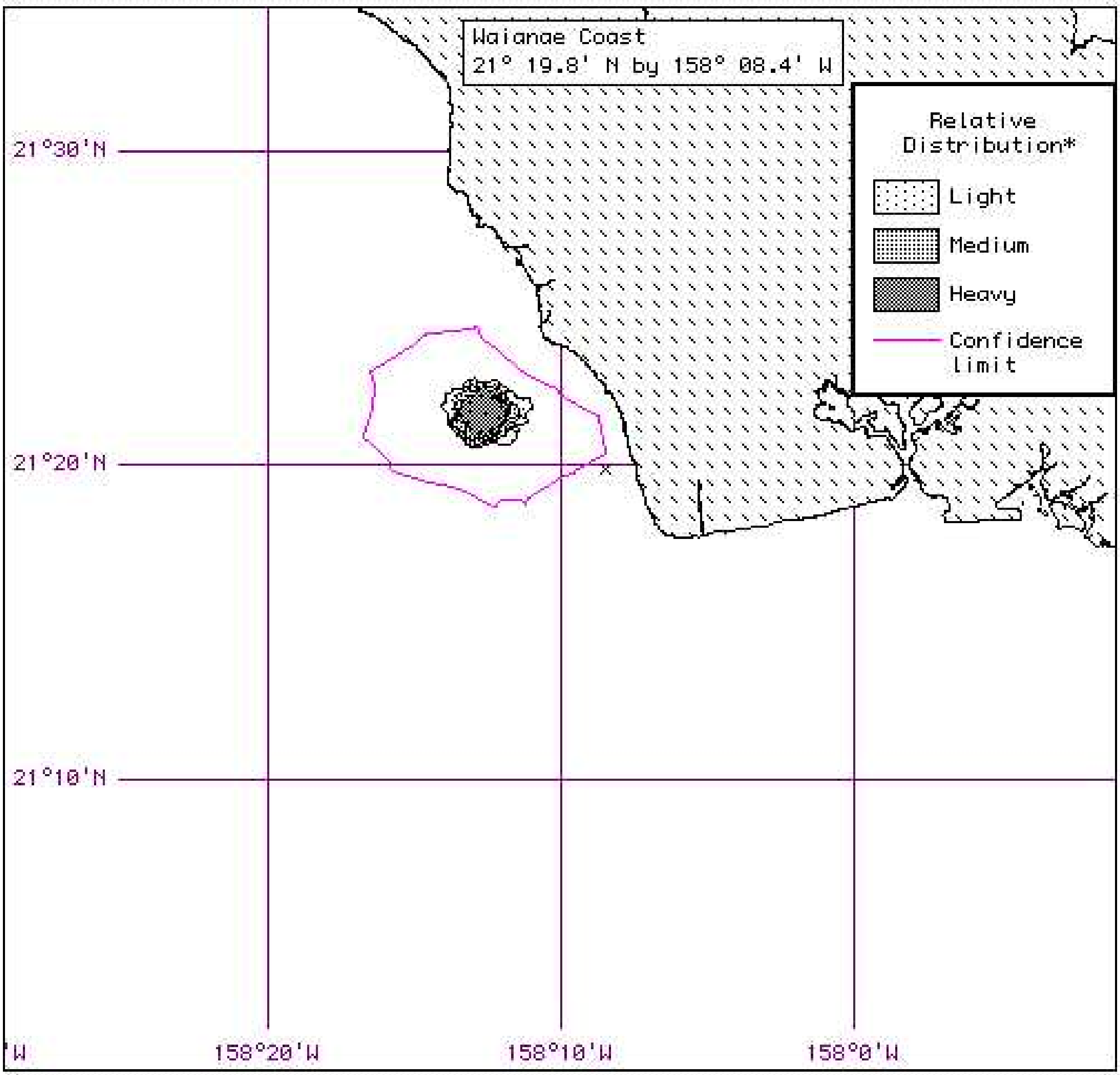
* this scale bar shows the meaning of the distribution terms at the current time

Waianae Coast **HAZMAT Trajectory Analysis**

Estimate for: 12 hrs

Prepared: 1009, 5/9/01 NOAA/HAZMAT (206) 526-6317

Operational window analysis model parameters:
Winds from E at 10 knots
Spill starts at beginning of flood tide
20,000 gallons of diesel fuel spilled instantaneously



* this scale bar shows the meaning of the distribution terms at the current time

APPENDIX I
WATER QUALITY ANALYSIS

PART 1-ELEMENTS IN SEA WATER

Table 1: Elements in Sea Water

Atomic Number	Element	Behavior	Predicted Mean Water Concentration
1	Hydrogen	Biogenic or hydrothermal origin	108 g/kg
2	Helium	Nonnutrient gas	1.9 nmol/kg
3	Lithium	Conservative	178 µg/kg
4	Beryllium	Nutrientlike, but increases with depth	0.2 ng/kg
5	*Boron	Conservative	4.4 mg/kg
6	*Carbon	Nutrient	2200 µmol/kg
7	*Nitrogen	Nonnutrient gas	590 µmol/kg
	Nitrate (species)	Nutrient	30 µmol/kg
8	Oxygen	Biological dependence	857 g/kg
9	Fluorine	Conservative	1.3 mg/kg
10	Neon	Nonnutrient gas	8 nmol/kg
11	*Sodium	Conservative	10.781 g/kg
12	*Magnesium	Conservative	1.28 g/kg
13	Aluminum		1 µg/kg
14	*Silicon	Nutrient	110 µmol/kg
15	*Phosphorus	Nutrient	2 µmol/kg
16	*Sulfur	Conservative	2.712 g/kg
17	*Chlorine	Conservative	19.353 g/kg
18	Argon	Nonnutrient gas	15.6 µmol/kg
19	*Potassium	Conservative	399 mg/kg
20	*Calcium	Correlates with carbonate alkalinity	415 mg/kg
21	Scandium		<1 ng/kg
22	Titanium		< 1 ng/kg
23	Vanadium	Conservative	< 1 µg/kg
24	Chromium	Nutrient-correlated; silicate and phosphate or nitrate	330 ng/kg
25	Manganese	Surface maximum; at depth, correlated with the labile nutrients and negatively correlated with dissolved oxygen	10 ng/kg
26	Iron	Correlated with the nutrients; negatively correlated with dissolved oxygen	40 ng/kg
27	Cobalt	Similar to manganese	2 ng/kg
28	Nickel	Nutrient-correlated; phosphate and silicate	480 ng/kg
29	Copper	Resembles nutrients with sedimentary release; scavenging at intermediate depths	120 ng/kg
30	Zinc	Nutrient-correlated; silicate	390 ng/kg
31	Gallium		10–20 ng/kg
32	Germanium	Nutrient-correlated; silicate	5 ng/kg
33	Arsenic	Nutrient-correlated; phosphate	2 µg/kg
34	Selenium	Nutrient-correlated; silicate and phosphate	170 ng/kg

Table 1: Elements in Sea Water (Continued)

Atomic Number	Element	Behavior	Predicted Mean Water Concentration
35	*Bromine	Conservative	67 mg/kg
36	Krypton	Nonnutrient gas	3.7 nmol/kg
37	Rubidium	Conservative	124 µg/kg
38	Strontium	Nutrient-correlated; phosphate	7.8 mg/kg
39	Yttrium	First approximation; conservative	13 ng/kg
40	Zirconium		< 1 µg/kg
41	Niobium		1 ng/kg
42	Molybdenum	Conservative	11 µg/kg
44	Ruthenium		0.5 ng/kg
45	Rhodium		
46	Palladium		
47	Silver		3 ng/kg
48	Cadmium	Nutrient-correlated; phosphate	70 ng/kg
49	Indium		0.2 ng/kg
50	Tin	Nonconservative; anthropogenic	0.5 ng/kg
51	Antimony	Conservative	0.2 µg/kg
52	Tellurium		
53	Iodine	Nutrient-correlated; nitrate and phosphate	59 µg/kg
54	Xenon	Nonnutrient gas	0.5 nmol/kg
55	Cesium	Conservative	0.3 ng/kg
56	Barium	Nutrient-correlated; silicate, alkalinity	11.7 µg/kg
57–71	Lanthanum and the Lanthanides	Nutrient- or depth-correlated	
72	Hafnium		< 8 ng/kg
73	Tantalum		< 2.5 ng/kg
74	Tungsten		< 1 ng/kg
75	Rhenium		4 ng/kg
76	Osmium		
77	Iridium		
78	Platinum		
79	Gold		11 ng/kg
80	Mercury	Nutrient-correlated; silicate	6 ng/kg
81	Thallium	Conservative	12 ng/kg
82	Lead	Nonconservative; anthropogenic	1 ng/kg
83	Bismuth		10 ng/kg
84	Polonium		
85	(Astatine)		
86	Radon		
87	(Francium)		

Table 1: Elements in Sea Water (Continued)

Atomic Number	Element	Behavior	Predicted Mean Water Concentration
88	Radium		
89	Actinium		
90	Thorium		< 0.7 ng/kg
91	Protactinium		
92	Uranium	Conservative	3.2 µg/kg

Source: Neshyba, S., 1987, p. 188.

* These eight elements are called conservative; they exist in uniform relative concentrations throughout all oceans.

= These are the commonly labeled plant *nutrient* elements.

Abbreviations used in this table:

g	grams
kg	kilograms
mg	milligrams
ng	nanograms
nmol	nanomols
µg	micrograms
µmol	micromols

PART 2-TRANSFORMATION OF PETROLEUM PRODUCT INTRODUCED TO THE MARINE ENVIRONMENT

Petroleum introduced to the marine environment goes through a variety of physical, chemical, and biological transformations during its transport by advective and spreading processes. Advection and spreading begin immediately after introduction of petroleum to the ocean and cause a rapid increase in the exposure area to subsequent "weathering" processes. Advection is due to the influence of overlying winds and/or underlying currents. Spreading results from a dynamic equilibrium between the forces of gravity, inertia, friction, viscosity, and surface tension. The weathering process includes evaporation, dissolution, vertical dispersion, emulsification, and sedimentation. Also, photochemical oxidation of some of the components of petroleum can be induced by sunlight. (National Academy Press, 1985, p. 270)

In addition to the physical and chemical processes identified above, biological processes also act on the different fractions of the original petroleum in various ways. Biological processes include degradation by microorganisms to carbon dioxide or organic components in intermediate oxidation stages, uptake by larger organisms and subsequent metabolism, storage, or discharge. (National Academy Press, 1985, p. 270)

- Evaporation—Evaporation may be responsible for the loss of from one-to two-thirds of an oil spill mass in a period of a few hours or a day, depending on the area of the slick, the oil composition, wind speed, and other factors.
- Dissolution—Dissolution is the act or process of dissolving one substance in another. Dissolved hydrocarbon concentrations in water are particularly important because of their potentiality for exerting a toxic effect on biological systems. This process is less important from the viewpoint of mass lost by the spill, for dissolution of even a few percent of a spill is unlikely. (National Academy Press, 1985, p. 277)
- Adsorption—This is the process by which one substance is attracted to and adheres to the surface of another substance without actually penetrating its internal structure. The various forms of oil in seawater can be sorbed onto settling particles and delivered to the bottom sediments (National Academy Press, p. 284).
- Biodegradation—This is the degradation of substances resulting from their use as food energy sources by certain microorganisms. Biodegradation of petroleum is seen by most workers as one of the principal mechanisms for removal of petroleum from the marine environment. Microorganisms (bacteria, yeasts, fungi) are important in the degradation of petroleum in surface films, slicks, the water column, and sediments. Zooplankton are known to aid in the sedimentation of oil droplets and oil associated with particulate matter through

their ingestion. (National Academy Press, 1985, p. 284). Benthic invertebrates such as polychaetes also have a significant role in the degradation of sediment-bound oil (Gardner, et al, 1979).

- Dispersion—Dispersion is the process of the distribution of spilled oil into the upper layers of the water column by natural wave action or application of chemical dispersants. The movement of oil into the water column determines the lifetime of a slick. The primary mechanism is believed to be propulsion by surface turbulence of oil into the water column as a "show" of oil droplets (National Academy Press, 1985, p. 289).
- Emulsification—Emulsification is the process whereby one liquid is dispersed into another liquid in the form of small droplets. Emulsification or mousse formation is dependent on the chemical composition of petroleum products, photochemical and microbial oxidation, and temperature.
- Photo Oxidation—The sunlight-promoted chemical reaction of oxygen in the air and petroleum products is one example of photo oxidation. About 25 percent of the average oil spill evaporated and, in the gaseous state, is almost certainly all oxidized photochemically by OH radical and other [gas] species in hours or days to CO, CO_2, oxygenated organics (Heicklen, 1976). These processes prevent oil's reentry into the sea as petroleum.

REFERENCES USED IN THIS APPENDIX

Gardner, et al, 1979. *Degradation of Selected Polycyclic Aromatic Hydrocarbons in Coastal Sediments: Importance of Microbes and Polychaete Worms,* Water Air Soil Pollution. 11:339-347, in National Academy Press, 1985. *Oil in the Sea, Inputs, Fates, and Effects,* Washington, D.C.: National Academy Press.

Heicklen, J., 1976. *Atmospheric Chemistry,* New York, New York: Academic Press, in National Academy Press, 1985. *Oil in the Sea, Inputs, Fates, and Effects,* Washington, D.C.: National Academy Press.

National Academy Press, 1985. *Oil in the Sea, Inputs, Fates, and Effects,* Washington, D.C.: National Academy Press.

APPENDIX J
MARINE SURVEYS

APPENDIX J, PART 1

REVISED FINAL DRAFT BASELINE MARINE ENVIRONMENTAL SURVEYS AT PROPOSED EHIME MARU SHALLOW-WATER RECOVERY SITES, OAHU, HAWAII

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June 4, 2001

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1.0 PURPOSE

The purpose of the marine environmental surveys described herein is to provide a baseline description of major benthic communities and associated species, including threatened and endangered species, located in the vicinity of three proposed *Ehime Maru* shallow-water berthing sites. The surveys provide a description of the affected marine environment upon which an assessment of potential direct and indirect impacts associated with shallow-water berthing, surface vessel mooring, and crewmember recovery operations will be based. This information will be utilized in an environmental assessment, prepared in accordance with implementing regulations of the National Environmental Policy Act, which will analyze and disclose the environmental consequences of the proposed *Ehime Maru* crewmember recovery project.

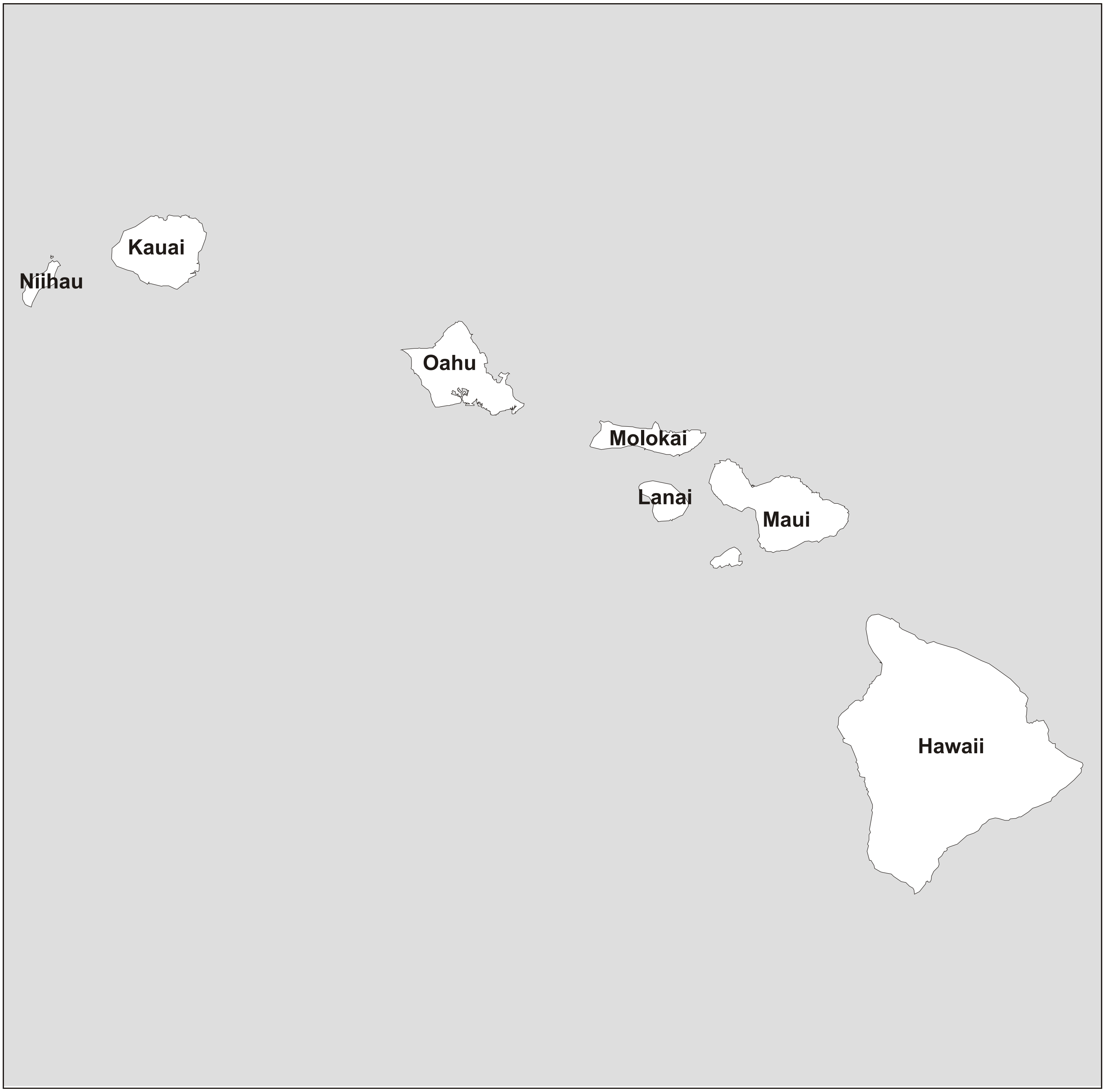
2.0 INTRODUCTION

The Hawaiian Islands are part of a linear chain of volcanoes that spans 3,800 miles (6,100 km) from the central to the northern Pacific Ocean. About halfway up its length, the chain bends, dividing the older sunken Emperor Seamounts (guyots) from the younger Hawaiian Ridge and the main Hawaiian Islands to the south (Figure J-1).

Ecologically complex marine ecosystems occur in Hawaiian waters to depths of 16,500 feet (5,000 meters) and extend inland from the coasts to include coastal marine ponds. Several factors control the variety, distribution, and abundance of marine life, including geographic isolation, subtropical climate, storm waves, and human-caused pollution and development.

Geographic isolation from the continents and other major island areas and reef systems has limited colonization by marine species. Species that were successful in reaching Hawaii sometimes evolved into new species that filled previously unoccupied ecological niches. Situated at latitudes ranging from 19 to 28 degrees north, Hawaii is exposed to cooler winter seawater temperatures and destructive waves creating a naturally harsh, mostly subtropical marine environment inhabited by fewer species than reported in the equatorial and tropical western Pacific. Hawaii's mid-ocean location permits storm waves from both the Arctic and Antarctica to reach the Islands unimpeded, causing repeated cycles of beach erosion, reef damage, and disruption of marine ecosystems. Storm surges and waves from tropical cyclones also cause significant disturbance to coastal and near shore benthic habitats (Juvik and Juvik [eds.] 1998).

Island subsidence, earthquakes, tsunamis, freshwater flooding, and coastal discharges have also affected the marine ecosystem. In recent times, agriculture-induced soil erosion, human-caused pollution, and coastal development have taken a significant toll on the marine environment around many of the main Hawaiian Islands.



Main Hawaiian Islands

NORTH

No Scale

Figure J-1

J_1SiteMap

3.0 METHODS AND PROCEDURES

The three proposed shallow-water recovery sites are located in coastal waters of leeward Oahu, Hawaii. Prior to initiation of the field surveys, the U.S. Navy provided position coordinates (latitude and longitude) to the consultant team for three proposed candidate recovery sites. These candidate sites met defined physical environmental conditions (depth, sand deposits) required for safe diving, mooring of the recovery vessel, and temporary seafloor berthing of the *Ehime Maru* during crewmember recovery operations.

Water depths ranging from 70 to 300 feet (21 to 90 meters) and associated limited bottom time precluded utilization of self-contained breathing apparatus (SCUBA) at the proposed shallow-water recovery sites. Instead, an underwater video system integrated with Differential Global Positioning System (DGPS) navigation was utilized to characterize and document bottom substrates, benthic habitats, and associated species.

The ***Sea-AllÔ*** video system consists of a high-resolution, color video, underwater camera integrated with DGPS. The camera is positioned in a weighted camera mount with a symmetrical hydrofoil shape. The camera mount stabilizes the camera during underwater surveys. The camera is aligned for a downward view while the survey vessel slowly moves along a defined transect line. A computer-based DGPS navigation system directs the pilot of the survey vessel along pre-planned transect lines.

The camera's field of view is approximately the same width as the distance of the camera above the substrate. The camera was maintained approximately 10 to 15 feet (3 to 5 meters) above the bottom. This provided a wide field of view and minimized the risk of accidentally damaging the camera or sensitive benthic communities. The camera was occasionally lowered to within a meter of the seafloor to define the presence of small features, such as individual coral heads or algae patches.

The DGPS coordinate information is superimposed onto the video image before recording onto Hi-8 videotape. The positioning information is logged onto the system's computer at a rate of once per second.

After completion of the survey, the videotapes are analyzed. Data analysis involves trimming the data files to include only that portion of each transects within the defined survey boundaries. A working copy of the computer data file is created and any coordinate information outside of the project area is deleted from the working copy of the computer file. Video analysis is then conducted on the portions of the videotape corresponding to the project survey grid.

During videotape analysis, attributes for each data point/coordinate surveyed are assigned. This datum is added to the DGPS coordinate files that were created during the survey. Attributes included habitats such as sand, coral rubble, and debris (tires, cables, and ballast), and resources such as live coral, seagrass, algae, and sea turtles. Data files containing coordinate and attribute information are then imported into AutoCAD to create a map of each location.

Sea Engineering, Inc., of Waimanalo, Hawaii, provided bathymetry data shown in the habitat maps. These data were provided as an AutoCAD layer and imported into the habitat maps.

3.1 Survey Locations

Underwater video surveys were conducted at three locations along the south shore of Oahu, Hawaii (Figure J-2). At each location, an area 1,000 feet by 1,000 feet (1,000,000 square feet [92,900 square meters]) was initially surveyed. Communications with U.S. Navy, federal, and state natural resource officials led to the establishment of the aforementioned dimensions of the survey grid. These dimensions were based on the length of the *Ehime Maru* and the mooring requirements for the relocation vessel and the diving barge.

Reef Runway Shallow-water Recovery Site

The proposed Reef Runway shallow-water recovery site is located south of the Honolulu International Airport Reef Runway, Honolulu, Hawaii. The 1,000,000 square foot (92,900 square meter) study area was centered at 21º17.6' north latitude and 157º55.8' west longitude, with transects running east to west (Figure J-3).

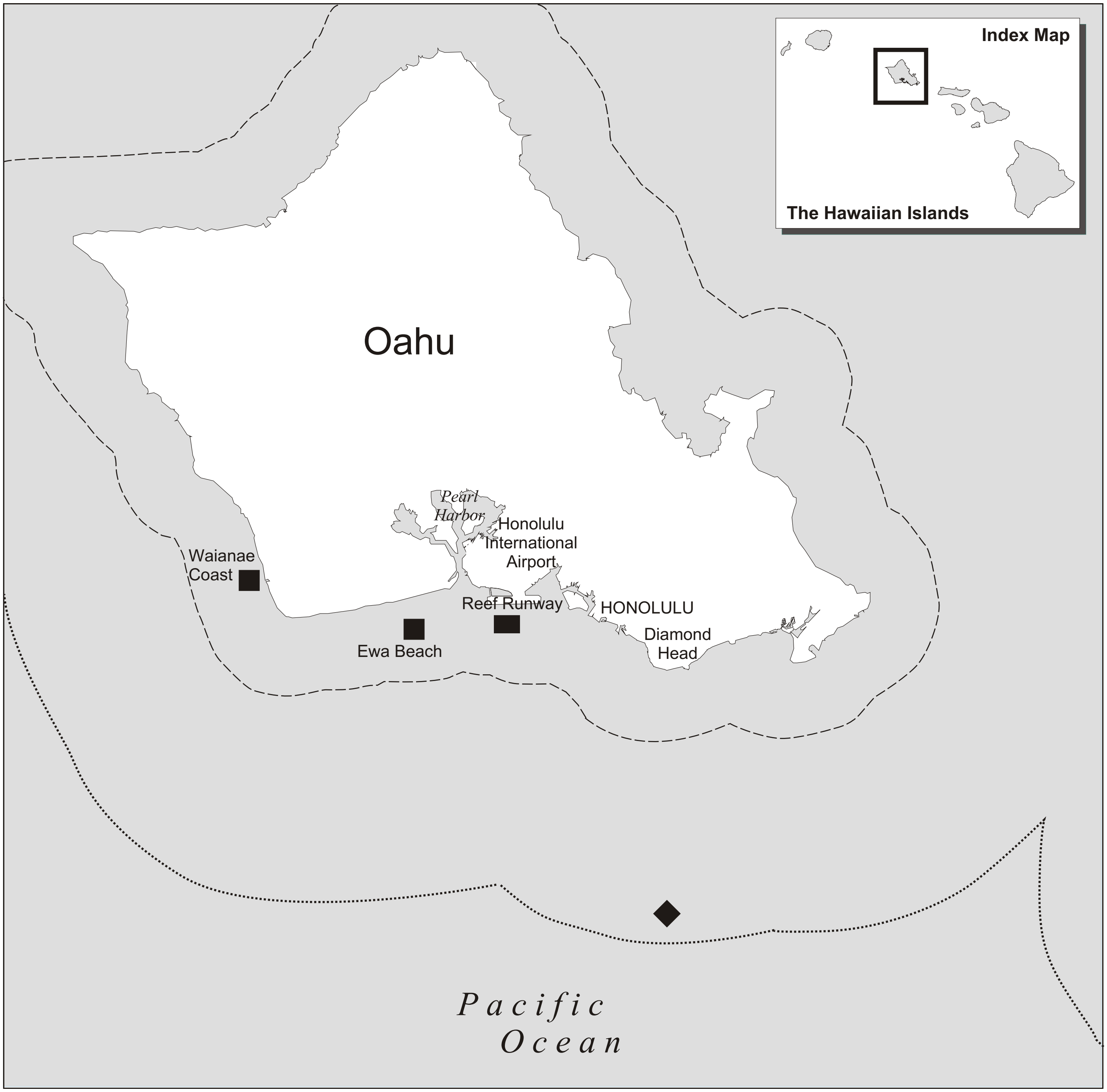
In consultations between Navy officials and the mooring design consultant, the survey area was expanded to cover an area 5,904 feet (1,800 meters) in length and 3,280 feet (1,000 meters) in width along the south side of the Reef Runway. The expanded study area extended from a depth of approximately 50 feet (15 meters) to 300 feet (90 meters), with transects running north to south (Figure J-4). The expanded survey area provided a broader range of siting opportunities for recovery vessel mooring and temporary shallow-water berthing of the *Ehime Maru*. Underwater video surveys were conducted at the expanded site on May 19 and May 23, 2001. Underwater diving surveys were conducted at point locations within the expanded site on May 31 and June 4, 2001.

The coordinates of the expanded study area are shown in Table J-1.

Table J-1. Longitude and Latitude Coordinates for the Expanded Reef Runway Shallow-water Recovery Area

Corner	Northing	Easting	Latitude	Longitude
NW	2355400	609600	21 deg. 17’ 49.88”	157 deg. 56’ 36.14”
NE	2355400	611400	21 deg. 17’ 49.29”	157 deg. 56’ 33.67”
SW	2354400	609600	21 deg. 17’ 17.16”	157 deg. 56’ 36.37”
SE	2354400	611400	21 deg. 17’ 16.77”	157 deg. 55’ 33.91”

Northing and Easting coordinates are in UTM, Zone 4 North, NAD 83, Meters. Geographic (Latitude/Longitude) coordinates are in NAD 83.



LEGEND

- ◆ Current Location
- ■ Potential Shallow-water Recovery Areas
- ········ U.S. Territorial Waters (12 Nautical Miles)
- – – – – Hawaii State Waters (3 Nautical Miles)

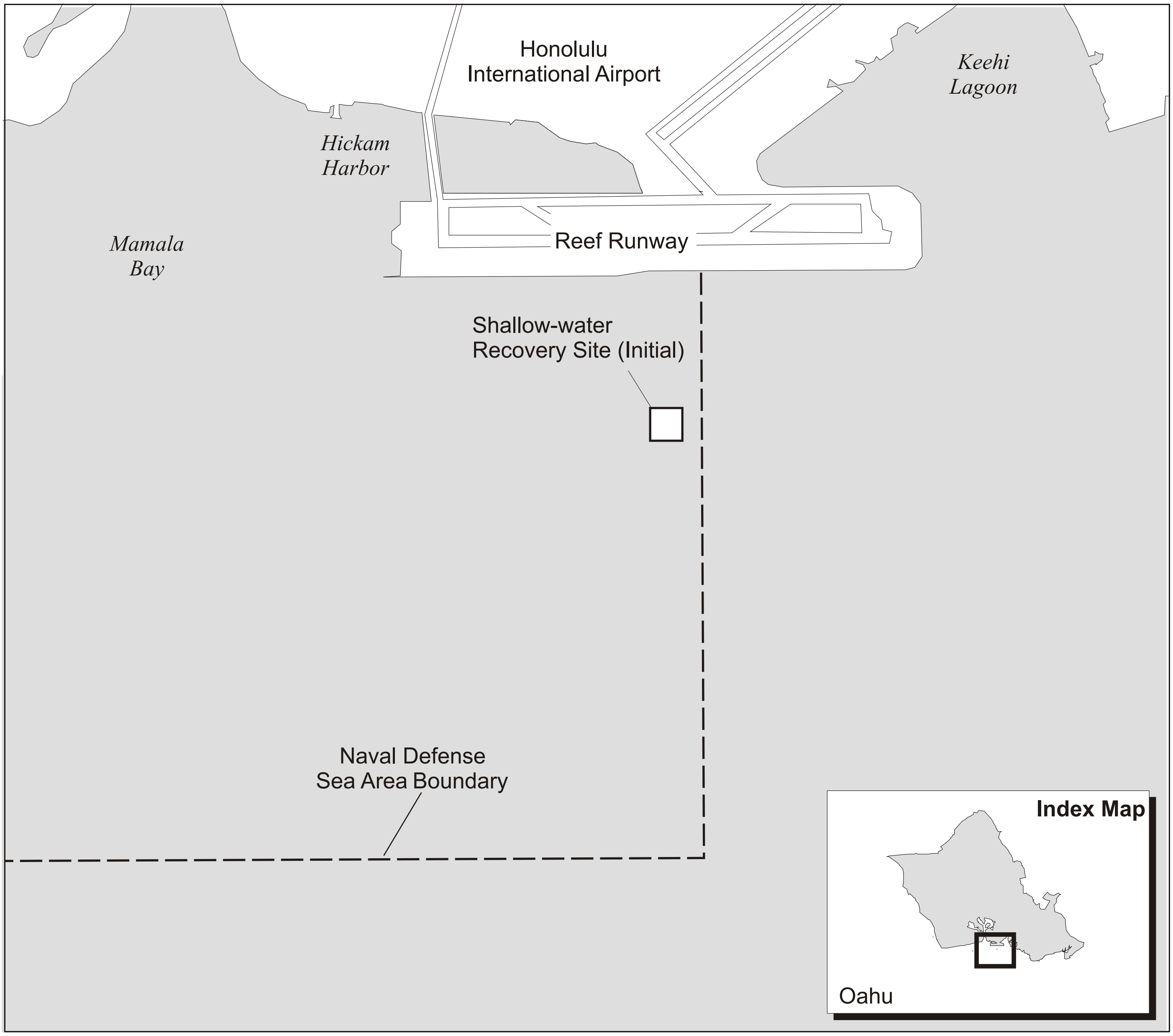
Shallow-water Recovery Sites

NORTH

No Scale

Figure J-2

2_1RelocationSite053101



LEGEND

Shallow-water Recovery Site

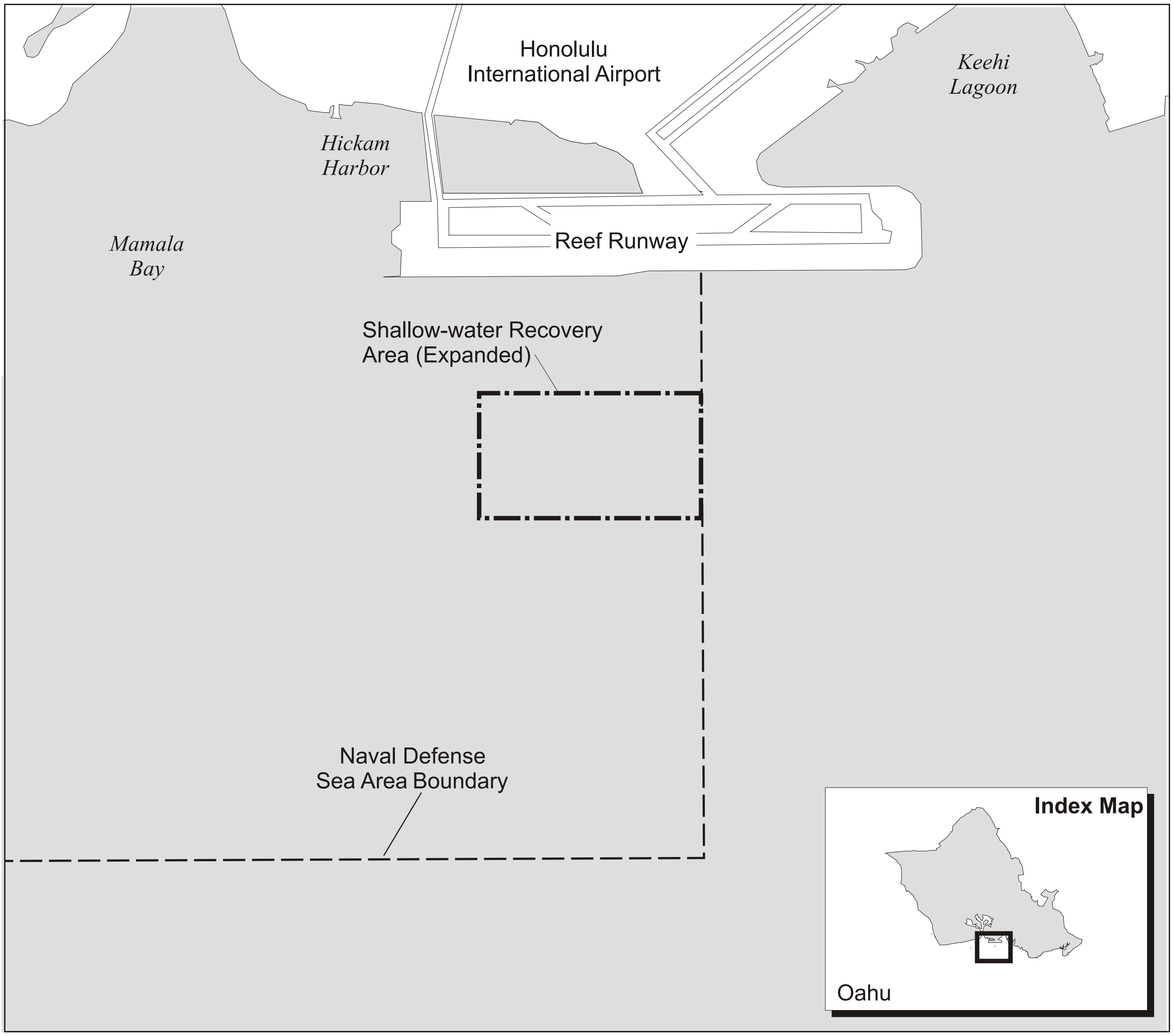
Reef Runway

No Scale

NORTH

Figure J-3

J_3ReefRunway



Reef Runway Shallow-water Recovery Area

No Scale

Figure J-4

J_4ExpandedArea

Ewa Beach Shallow-water Recovery Site

The proposed Ewa Beach shallow-water recovery site is located seaward of Ewa Beach and west of the mouth of Pearl Harbor, Oahu, Hawaii. The 1,000,000 square foot (92,900 square meter) study area was centered at 21º17.5' north latitude and 158º00.8' west longitude, with transects running east to west (Figure J-5).

Waianae Coast Shallow-water Recovery Site

The proposed Waianae Coast shallow-water recovery site is located north of Barbers Point, Oahu, Hawaii, and offshore of the Ko Olina Resort. The 1,000,000 square foot (92,900 square meter) study area was centered at 21º19.8' north latitude and 158º08.4' west longitude, with transects running north to south (Figure J-6). Due to a transcription error that occurred during project mobilization the center of the area surveyed was 0.1' to the west from the planned center point (158º08.3' west longitude). This resulted in an offset of approximately 173 meters (568 feet).

3.2 Survey Methods

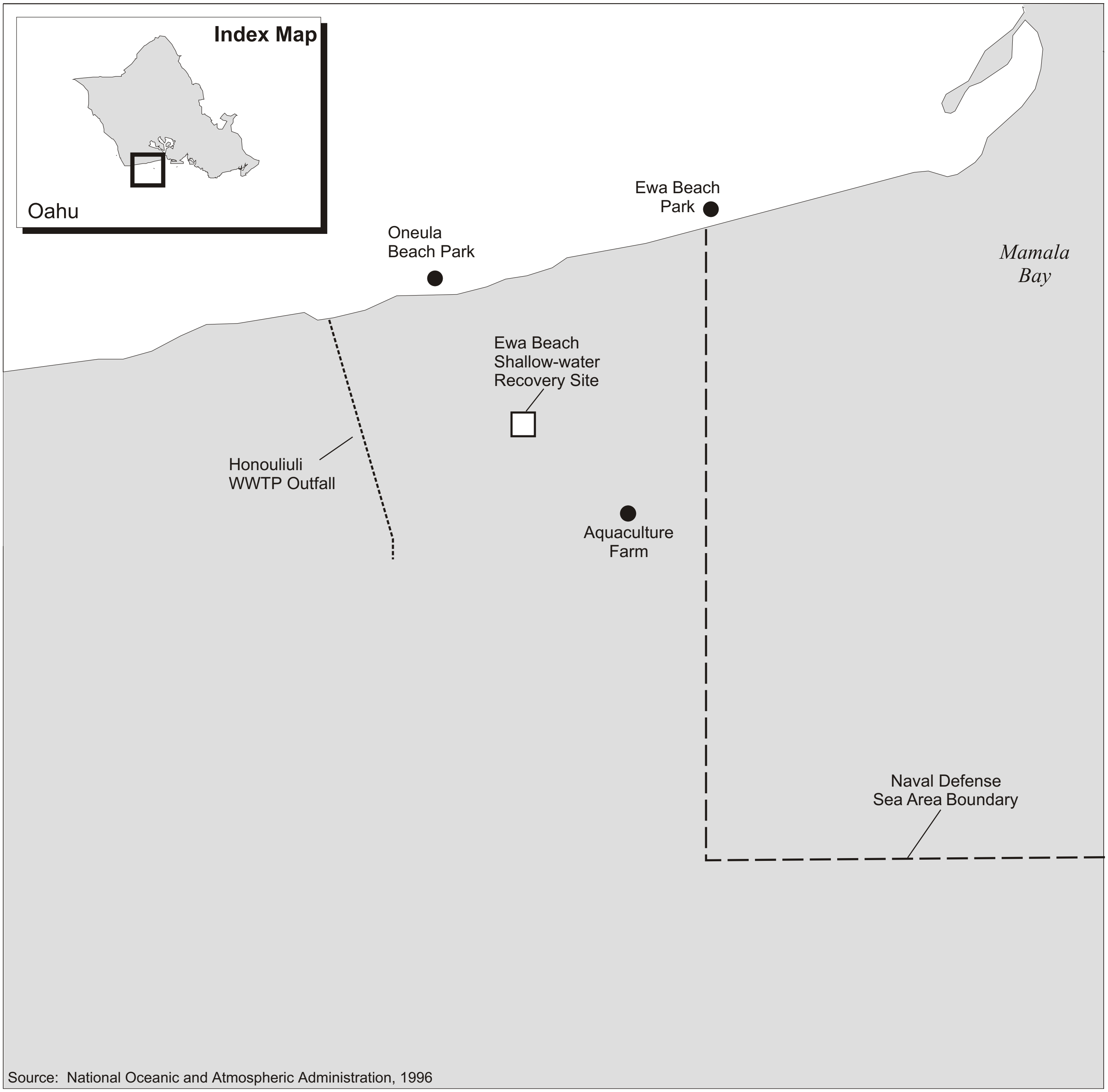
The ***Sea-AllÔ*** video mapping system was used to document and describe seafloor substrates and benthic habitats. At each location, 13 transects, approximately 1,500 feet-long (455 meters) and spaced approximately 100 feet (30 meters) apart, were established to provide representative coverage of the 1,000,000 square foot (92,900 square meter) survey site. The center point of each location was converted into the Universal Transverse Mercator (UTM) coordinate system using Corpscon for Windows Version 5.11.08 (freeware program provided by U.S. Army Corps of Engineers). The coordinate system used was UTM, Zone 4 North, North American Datum 1983, in meters.

A series of transect lines were then generated around the center point. Transects were laid out to run generally parallel to the shoreline. Therefore, they were configured to run either east to west or north to south, depending on the predominant direction of the adjacent shoreline at each proposed shallow-water recovery site. The survey vessel followed these transects while recording bottom features.

Site-Specific Notes

The proposed Waianae Coast shallow-water recovery site was surveyed on April 24, 2001. A total of 13 transects were surveyed (Figure J-7). The beach runs diagonally at this site from the northwest to the southeast. As a result, the survey area was skewed slightly, with the northeast corner being closest to the beach.

Surveys were conducted at the proposed Ewa Beach shallow-water recovery site on April 23, 24, and 25, 2001. Additional north-to-south transects, aligned perpendicular to the beach, were also surveyed (Figure J-8). The additional survey transects were analyzed in the field and no post-processing was performed. The surveys conducted on April 23 – 24, 2001, were to provide additional information on water depths and to document the



LEGEND

Shallow-water Recovery Site

Ewa Beach

NORTH

No Scale

Figure J-5

J_5EwaBeach

LEGEND

Shallow-water Recovery Site

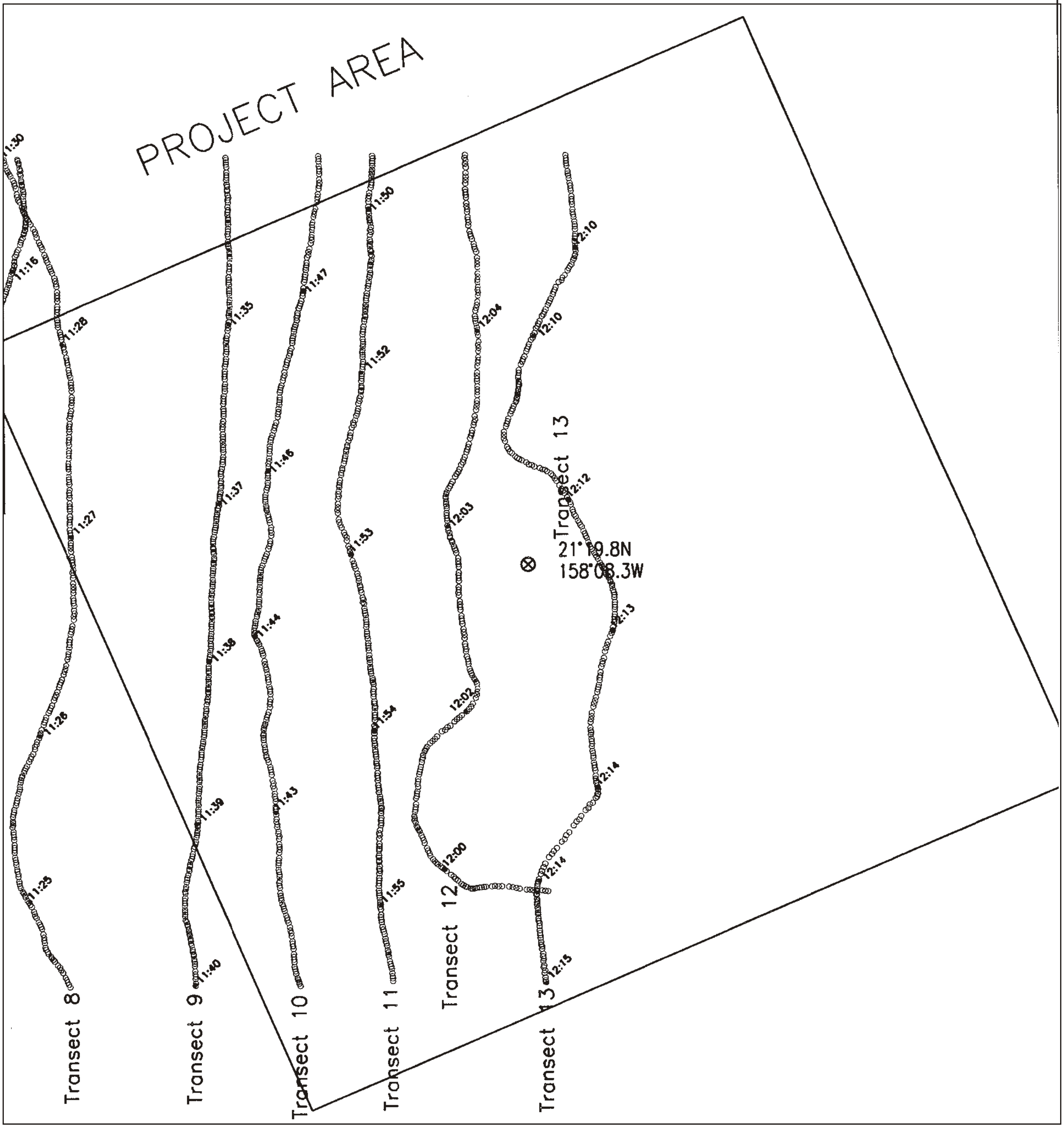
Waianae Coast

NORTH

No Scale

Figure J-6

J_6WaianaeBeach



LEGEND

Vessel Track

*11:39 Time Stamp

NORTH

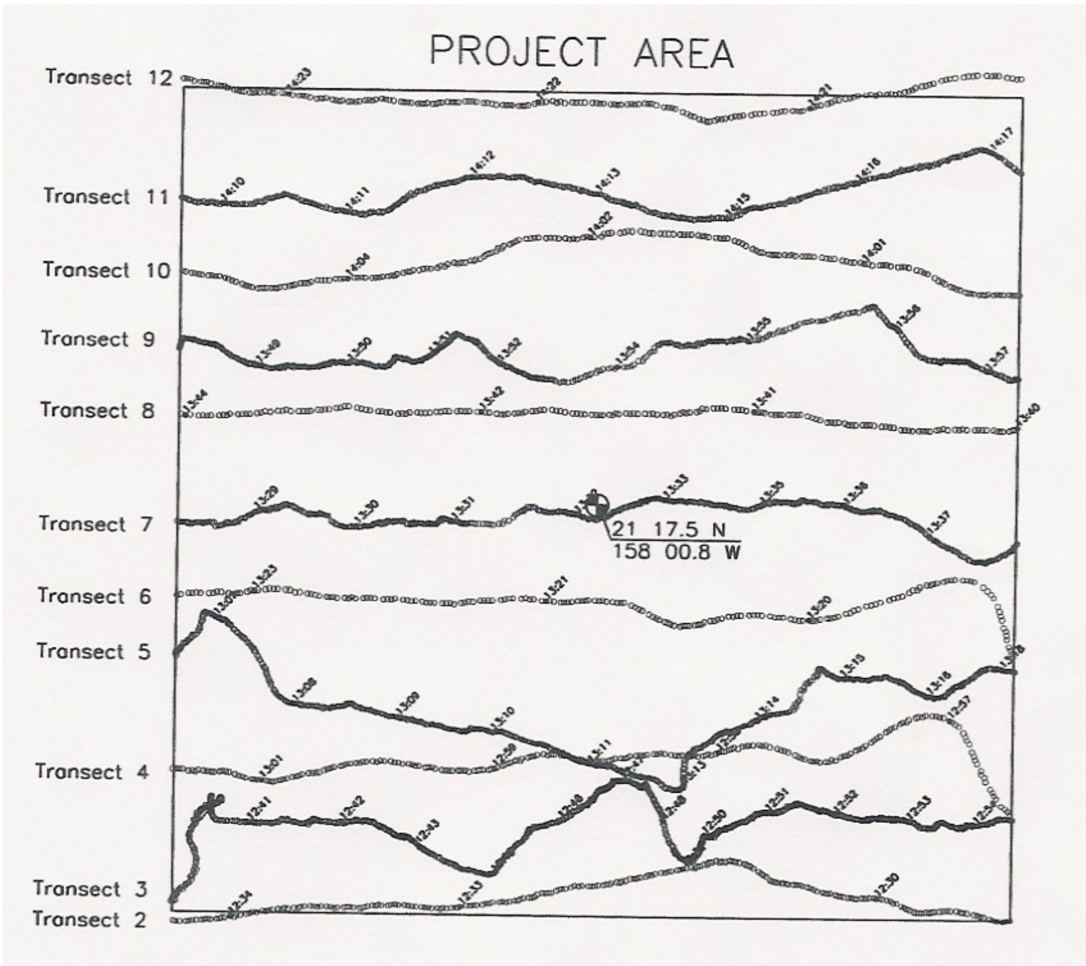
0 30 60 Meters

0 98 196 Feet

Waianae Coast Video Habitat Survey Transects

Figure J-7

J_7VideoHabitat



LEGEND

Vessel Track

*11:39 Time Stamp

Ewa Beach Video Habitat Survey Transects

NORTH

0 35 70 Meters

0 114 228 Feet

Figure J-8

J_8VideoHabitatEwa

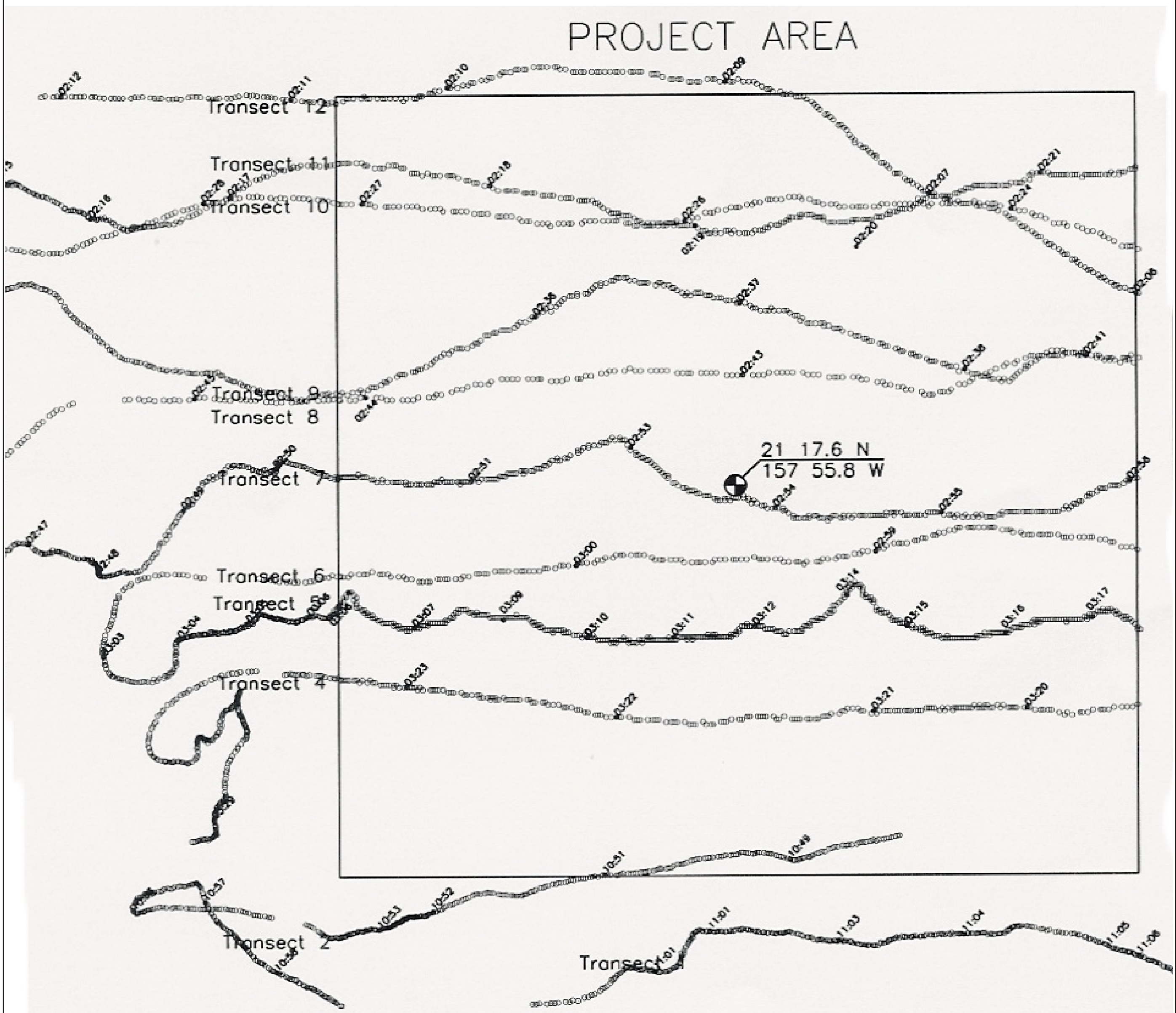
presence or absence of seagrass that represented potential forage for sea turtles. The survey conducted on April 25, 2001 was to allow National Marine Fisheries Service (NMFS), U.S. Fish & Wildlife Service (USFWS), and Hawaii State Department of Land and Natural Resources (DLNR) personnel to observe and document bottom substrates, benthic habitats (e.g., live coral, coral rubble), and associated fish and invertebrates. The videotape from the April 25, 2001 survey was not analyzed.

The underwater video system was deployed at the proposed Reef Runway shallow-water recovery site on April 22 - 23, 2001 to survey the 13 established transects. Additional north-to-south transects were surveyed on April 24 - 25, 2001 (Figure J-9). The added survey transects were analyzed in the field and no post-processing was performed. The survey conducted on April 24, 2001 provided additional information on water depths and seagrass distribution and abundance. The April 25, 2001 survey enabled NMFS, USFWS, and DLNR personnel to observe benthic habitats and locate areas potentially supporting native seagrass and other potentially sensitive resources. The state and federal resource agency personnel then surveyed selected areas within the survey grid using SCUBA to confirm video observations, develop species checklists, and collect seagrass samples for taxonomic identification.

During videotape analysis, data collected to the west and south of the proposed Reef Runway shallow-water recovery area was included in order to address the possibility of moving the project site to the west to avoid disturbance to corals and seagrass beds.
The original 1,000,000 square-foot (92,900 square meter) study area located off the south side of the Reef Runway was found to be of insufficient size and depth for the planned anchoring array required for the mooring of the *Ehime Maru* recovery vessel.

During surveys of the expanded Reef Runway study area, the transects were spaced at 246-foot (75-meter) intervals (Figure J-10). Transect numbering started at transect 14, continuing the sequence where the previously surveyed transect numbers ended. Transects were aligned perpendicular to the shore along a north/south axis. The north end of each transect was located at a depth of approximately 50 feet (15 meters). Each transect ended when the camera was lowered to the maximum length of the video cable and the bottom substrate could no longer be viewed. This usually occurred at a depth of approximately 130 feet (40 meters). All transects ending at a depth of approximately 130 feet (40 meters) were conducted on May 19, 2001.

Subsequent to the completion of the May 19, 2001 surveys, recovery vessel mooring design plans indicated the possible need for moorings to be placed at depths in excess of 130 feet (40 meters). Because the length of the video cable utilized on the May 19, 2001 surveys was insufficient to record substrate and habitat data at depths in excess of 130 feet (40 meters), a second video camera with a 500-foot (152-meter) cable was installed. The new camera successfully interfaced with the video mapping system, and the remaining transects were conducted on May 23, 2001. Transects surveyed on May 23, 2001 focused on the western half of the study area to avoid the potential presence of sensitive resources on the eastern side of the study area.



Source: Pentec, 2001

LEGEND

Vessel Track

*11:39 Time Stamp

NORTH

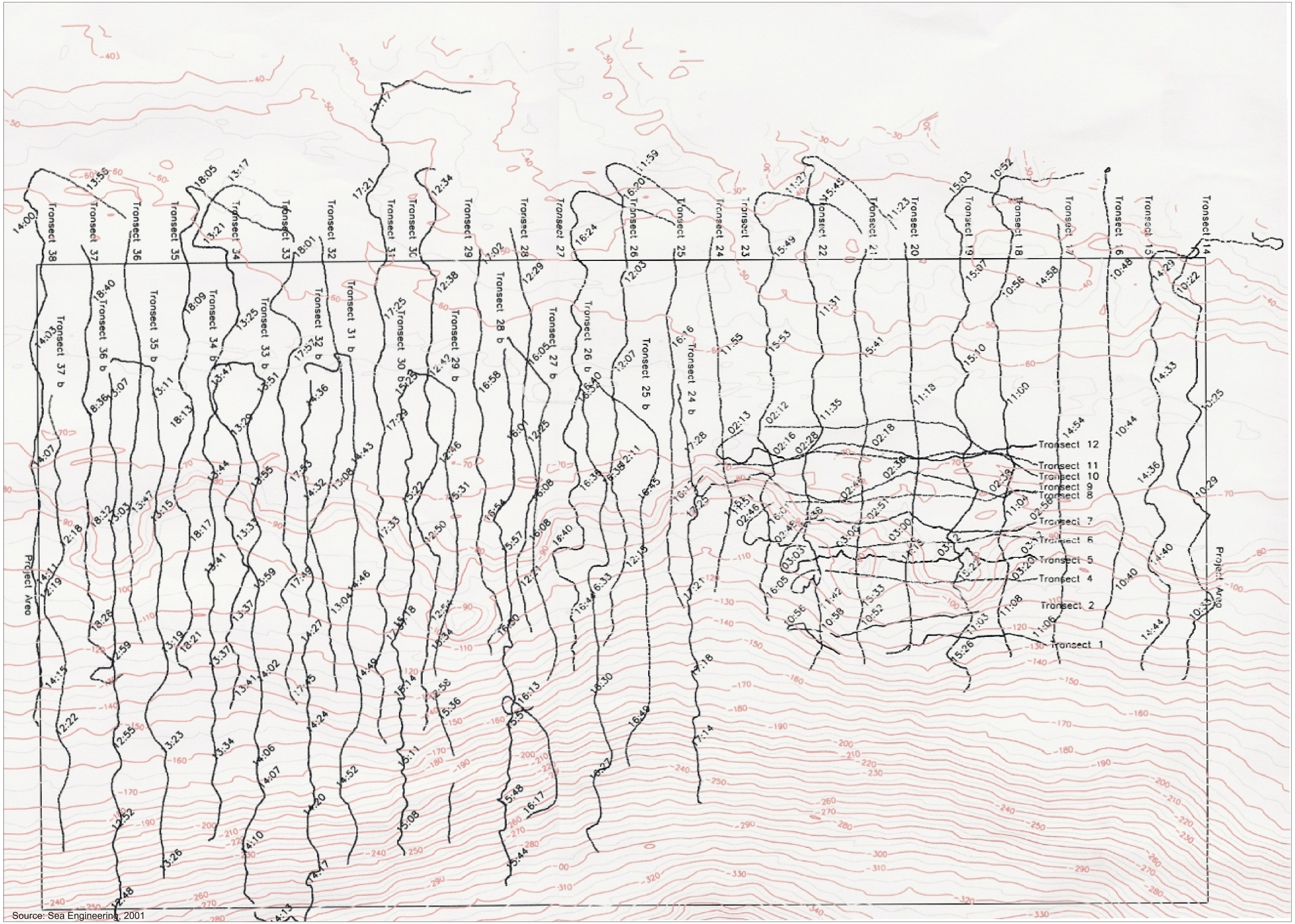
0 35 70 Meters

0 114 228 Feet

Reef Runway Video Habitat Survey Transects

Figure J-9

J_9VideoHabitatReef



Source: Sea Engineering, 2001

Expanded Area Reef Runway Video Habitat Survey Transects

LEGEND

Vessel Track

*11:39 Time Stamp

0 75 150 Meters

0 246 492 Feet

NORTH

Figure J-10

The expanded deepwater transect lines were spaced 246 feet (75 meters) apart and aligned to fall between transects surveyed on May 19, 2001. Transects were identified with the letter "b" to indicate their position between previously surveyed transect lines. These transects covered a water depth of approximately 70 to 250 feet (21 to 76 meters). Two transects (26b and 28b) extended to a depth of 300 feet (91 meters). Since the bottom topography in the survey area was known from transect lines 14 through 38, the camera was operated closer to the substrate along "b" transects. This provided greater detail in viewing bottom features, particularly at depths in excess of 130 feet (40 meters), but narrowed the field of view.

Lighting conditions were favorable, allowing video surveys to be conducted using ambient light, even at depths in below 250 feet (76 meters). Supplemental lighting was utilized only on transect 24b, which ended at a depth of 270 feet (82 meters). This transect was surveyed between 1714 and 1730 hours when the sun was at a low angle to the water.

A complete record of all transect substrate, habitat, species occurrence and distribution data obtained during the surveys conducted on May 19 and May 23, 2001 is found in approximately 13 hours of Differential Global Positioning System (DGPS)-referenced video tape, that is a part of the project's permanent data record. These data provide approximately 47,000 discrete DGPS-referenced transect coordinates that are integrated with the corresponding substrate or habitat feature(s). The section that follows provides a summary of the major substrate and habitat features, and represented species populations, that characterize the expanded Reef Runway shallow-water recovery area survey grid.

4.0 RESULTS

4.1 REEF RUNWAY SHALLOW-WATER RECOVERY SITE

4.1.1 Overview

The Reef Runway shallow-water recovery site is located on the seaward reef slope immediately south and offshore of the mid-point of the runway. The fringing coral reef that once formed the seaward boundary of Keehi Lagoon was destroyed during construction of the Reef Runway. Prior to World War II, Keehi Lagoon was a tideland lagoon located on mudflats and a fringing coral reef that extended from Barbers Point to Diamond Head. The western terminus of the Reef Runway abuts the Pearl Harbor Channel. During World War II, the U.S. Navy initiated dredging operations to create seaplane runways in Keehi Lagoon. Three seaplane runways, dredged to approximately 13 feet (4 meters) mean sea level were constructed; each was 1,000 feet (303 meters) wide and between 10,000 and 16,000 feet (3,030 and 4,848 meters) in length. Later dredging resulted in the creation of a small boat channel just south of the Fort Kamehameha Military Reservation (Federal Aviation Administration, 1972).

As a result of dredging, the Keehi Lagoon became a popular recreational area for boating, fishing, sailing, swimming, and waterskiing. More recently, thrillcraft (jet-ski) recreation has assumed prominence. Little attention was given to the mass transport of water and the circulation patterns within Keehi Lagoon when Kalihi Channel, seaplane runways, and the channel leading to Hickam Harbor were constructed. As a result, inadequate circulation patterns created a trap for organic and inorganic pollutants that contributed to significant water pollution from sewage, industrial discharges, and other point and non-point pollution sources. The watersheds of Kalihi, Moanalua, and Kapalama streams were also contributors of pollutants and sediments of terrestrial origin to Keehi Lagoon.

Construction of the Reef Runway between 1973 and 1977 resulted in the destruction of 1,240 acres (5,018,000 square meters) of marine and estuarine habitat as a result of filling, dredging and channel construction. The former Keehi Lagoon fringing reef was destroyed by runway filling and placement of massive basalt boulders and pre-cast concrete dollose for shore protection. A total of 19,000,000 cubic yards (14,526,500 cubic meters) of fill was obtained through hydraulic suction dredging. Approximately 765 acres (3,059,000 square meters) of the 1,240 acres (5,018,000 square meters) of affected lagoon was described as "offshore land" (Federal Aviation Administration, 1972).

As part of runway construction, a new channel was dredged to allow access of small boats to Hickam Harbor. A second channel was dredged around the eastside of the Reef Runway for water circulation into and out of the lagoon. Kalihi Channel was also widened and deepened to provide an additional source of fill material for runway construction. A 240-acre (971,000 square meter) marine pond was dredged on the north side of the runway to provide additional fill material. Eleven circulation culverts were constructed to increase water exchange between the pond and adjacent waters. However, water quality within the pond is poor, as demonstrated by year-round eutrophic conditions. High levels of fecal coliform bacteria were consistently recorded east of the runway where sewage effluents were previously discharged. Diversion of sewage effluents from an outfall one-half mile offshore to a deep outfall site in about 240 feet (73 meters) of water nearly two miles offshore reportedly improved water quality within Keehi Lagoon and adjacent near shore waters (U.S. Army Engineer District, 1979).

Three designated naval anchorage areas (Anchorages B, C, and D) are located along the south side of the runway beginning at roughly the mid-point of the runway and extending about one mile (1,600 meters) to the east. A designated dump site (for dredged materials) is located about 3 miles (4,800 meters) south (seaward) of the west side of the runway (National Oceanic and Atmospheric Administration Map No. 19357, dated September 18, 1999).

4.1.2 Physical Setting

The original Reef Runway shallow-water recovery study area demonstrates water depths of approximately 70 feet (21 meters) on the north (landward) side and 110 feet (33 meters) on the south (seaward) side. The overall slope across the survey grid averages about 4 percent. A roughly 15-foot (5-meter) escarpment with an estimated slope of 30-35 percent occurs between the 72 to 90 foot (22 to 27 meter) depth contours. This feature was identified during underwater video surveys conducted on April 22, 2001, and subsequently confirmed on April 25, 2001 during dive surveys conducted by NMFS, USFWS, and DLNR personnel. Sand, coral rubble, and occasional live corals dominate the substrate at depths above 75 feet (23 meters). Surface relief is about 3 feet (1 meter) or less and results from mounds of coral rubble and live coral. At depths between 90 and 95 feet (27 and 29 meters) sand is abundant and interspersed with patches of limestone rubble and occasional live coral outcrops. Surface relief is about 2 feet (0.6 meters) or less. At depths below 95 feet (29 meters) the substrate is dominated by limestone with a coralline sand veneer. Vertical relief in waters below 95 feet (29 meters) is negligible.

The expanded Reef Runway shallow-water recovery study area grid is located within latitude and longitude coordinates identified in Table J-1. The expanded study grid is 5,904 feet by 3,280 feet (1,800 by 1,000 meters) in dimension, encompassing a surface area of 19,365,000 square feet (1,800,000 square meters) (Figure J-4). The entire 1,000,000 square-foot survey area described in section 3.1 is located within the eastern quadrant of the expanded study grid.

Vertical relief along the extreme north side of the study grid ranges between an estimated 3 to 6 feet (1.2 – 1.8 meters) at water depths between 30 and 40 feet (9 – 12 meters). Vertical relief in this inshore area results from fringing reef surge channels and reef depressions, eroded reef limestone, limestone rubble, and live and dead coral colonies. Most of this area was outside the expanded survey grid and was excluded from the data record.

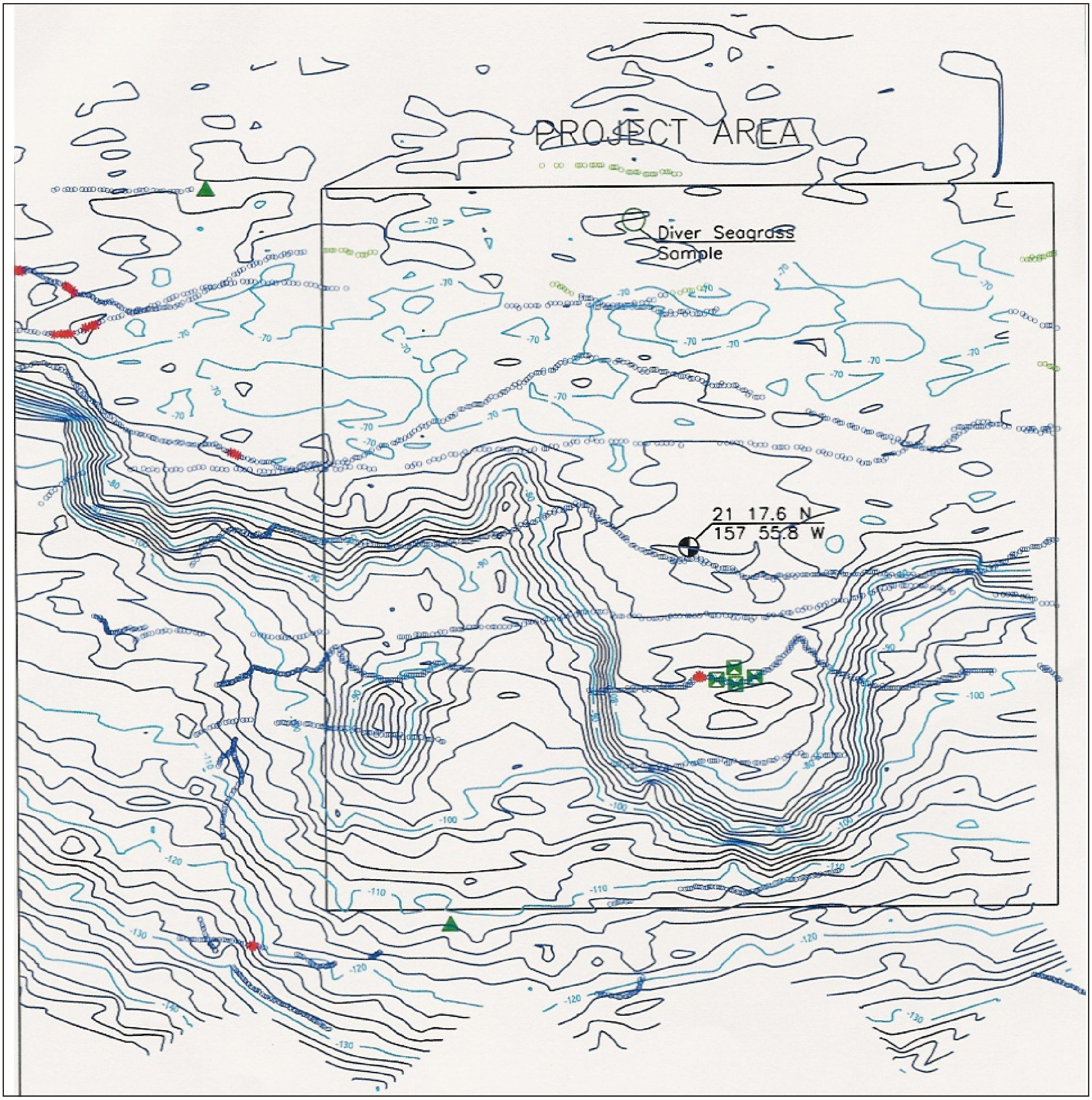
A submarine terrace dominated by sand and coral rubble is the most conspicuous physical feature along the northern half of the grid. The terrace occurs between the 60 and 70-foot (18 – 21 meter) depth contours and is 500 to 1,400 feet (152 – 427 meters) wide. The slope across the terrace ranges from approximately 0.007 to 0.02 percent. Vertical relief is estimated at less than 2 feet (0.6 meters) and is a result of coral rubble, live and dead coral outcrops, and debris. Debris has been defined as anthropogenic materials, including tires, appliances, ballast, anchors, cables, bottles, and other unidentified objects observed on or extending above the substrate.

The seaward reef slope ranges between 5 and 8 percent at depths between 70 and 120 feet (21-37 meters). Between 120 and 250 feet (37 – 76 meters) the slope increases to 10 percent on the west and up to 16.5 percent on the east side of the grid. Vertical relief is estimated at less than 1.5 feet (0.5 meters) at water depths between 70 and 170 feet (21 – 52 meters), and is the result of coral rubble, live coral colonies, and debris.

Vertical relief at water depths between 170 and 300 feet (52 – 91 meters) is estimated at one foot (0.3 meters) and is a result of sand mounds produced by burrowing worms.

4.1.3 Biota

At the original Reef Runway shallow-water study area, corals were common on the upper reaches of the study area but overall population density is low (Figure J-11). *Pocillopora meandrina* (cauliflower coral) is the most common coral observed on transects with highest densities occurring in waters of 90 feet (27 meters) or less. Overall coral coverage is generally less than 1 percent in waters of 90 feet (27 meters) or less, though localized areas, particularly along the escarpment, occasionally demonstrate an estimated 5 - 25 percent coverage. Other corals occasionally observed, though generally uncommon, are *Porites lobata* (lobe coral) and *Porites compressa* (finger coral) (Table J-2). Pockets of coral rubble are often dominated by dead and fragmented *P. compressa* colonies. A single table (bracket-forming) coral, possibly



LEGEND

- Live Coral
- Coral Rubble
- Seagrass
- Debris
- Ballast

NORTH

0 35 70 Meters

0 114 228 Feet

Reef Runway Benthic Habitats

Figure J-11

J_11ReefBenthic

Porites rus or *Montipora verrucosa,* was observed in 95 feet (29 meters) of water during video surveys. Several colonies of the antler coral, *Pocillopora eydouxi,* were also observed atop the escarpment.

Table J-2: Checklist Of Corals, Algae, Seagrass And Invertebrates, Reef Runway Shallow-Water Recovery Site*

ALGAE

<u>Chlorophyta (Green Algae)</u>
Neomeris annulata

<u>Rhodophyta (Red Algae)</u>
Asparagopsis taxiformis
Liagora sp.

SEAGRASS (MARINE ANGIOSPERM)

Halophilia discipiens ***(introduced species)***

PHYLUM CNIDARIA (CORAL, HYDROIDS, SEA ANEMONES, JELLYFISHES)

Class Scleractinia (Stony Corals)
<u>Family Acroporidae</u>
Montipora sp. (*verrucosa*?)

<u>Family Poritidae</u>
Porites lobata ***(Lobe coral)***
Porites compressa ***(Finger coral)***
Porites sp. (*rus*?) (bracket-forming)

<u>Family Pocilloporidae</u>
Pocillopora meandrina ***(Cauliflower coral)***
Pocillopora eydouxi ***(Antler coral)***

PHYLUM PORIFERA (SPONGES)

Phorbas sp.
Clathria (Microciona) sp.
PHYLUM ECHINODERMATA (SEA STARS, SEA URCHINS, SEA CUCUMBERS)

Class Asteroidea (Sea Stars)
<u>Family Acanthasteridae</u>
Acanthaster planci ***(Crown-of-thorns starfish)***

Class Echinoidea (Sea urchins)
<u>Family Diadematidae</u>
Diadema sp. (Black sea urchin)
Echinothrix diadema ***(Black sea urchin)***
Echinothrix calamaris

<u>Family Echinometridae</u>
Echinostrephus aciculatus

Table J-2: Checklist Of Corals, Algae, Seagrass And Invertebrates, Reef Runway Shallow-Water Recovery Site* (Continued)

Family Toxopneustidae
Tripneustes gratilla (Collector urchin)

Family Cidaridae
Chondrocidaris gigantea

Class Holothuroidea (Sea Cucumbers)
Family Holothuridae
Holothuria atra (or *Holothuria nobilis*) (Black sea cucumber)

PHYLUM MOLLUSCA (CLAMS, SNAILS, OYSTERS, NUDIBRANCHS)

Class Gastropoda (Snails and Slugs)
Smaragdia bryanae

Class Bivalvia (Clams and Oysters)
Arca sp.
Pinctada radiata *(Pearl oyster)*

Class Nudibranchia (Nudibranchs)
Phyllidia varicosa

PHYLUM ANNELIDA (WORMS)

Class Polychaeta (Segmented Worms)
Family Serpulidae
Spirobranchus giganteus *(Christmas tree worm)*

PHYLUM CRUSTACEA (CRABS, LOBSTERS, SHRIMP)
Class Decapoda (True Crabs)
Family Xanthidae
Trapezia ferruginea

* Checklist provided by Kevin B. Foster, Fish and Wildlife Biologist, U.S. Fish & Wildlife Service, Pacific Islands Ecoregion, Honolulu; *A. planci* record provided by John J. Naughton, Pacific Islands Environmental Coordinator, National Marine Fisheries Service, Southwest Region, Honolulu, Hawaii. Data from dives conducted on April 25, 2001 and May 2, 2001. *Holothuria atra* (or *Holothuria nobilis*), Porites sp. and *Montipora* sp. records from video survey data.

Earlier studies in the vicinity of the Reef Runway reported the coral *Pavona duerdeni* and the zooanthid *Palythoa tuberculosa* as common on the upper reef slope (U.S. Army Engineer District, 1979). The same study also cited *P. compressa* as the dominant coral at a depth of 65 feet (20 meters).

The fish fauna is generally limited to small coral-associated species that were generally found in or adjacent to live coral outcrops. A total of 33 species representing 16 families were recorded during dive surveys conducted on April 25, 2001 and May 2, 2001 (Table J-3). The moorish idol, *Zanclus cornutus,* was observed on several occasions, as was the reef triggerfish, *Rhinecanthus rectangulus.* Large schools of the Hawaiian dascyllus, *Dascyllus albisella,* were observed in or hovering in close proximity to *P. meandrina* colonies. A yellow-margined moray (*Gymnothorax flavimarginatus)* and an undulated moray (*Gymnothorax undulatus)* were also recorded. Introduced fishes observed in the study area included the blue-spotted grouper, *Cephalopholis argus,* and the bluelined snapper, *Lutjanus kasmira.* Other represented families included various mullids (goatfishes), chaetodontids (butterflyfishes), pomacentrids (damselfishes), labrids (wrasses), scarids (parrotfishes), and acanthurids (surgeonfishes).

Earlier studies have reported a moderately diverse fish fauna on the reef slope adjacent to the Reef Runway. Fish species identified as "abundant" in the area included *Acanthurus triostegus*, *A. nigrofuscus, Ctenochaetus strigosus, Thalassoma duperrey, Chaetodon multicinctus, Chromis vanderbilti, Stegastes fasciolatus, Canthigaster jactator* and *Scarus* sp. (U.S. Army Engineer District, 1979).

The invertebrate fauna was composed of 16 identified invertebrates with echinoderms accounting for half of the checklist (Table J-2). The invertebrate fauna associated with the sand-veneered limestone terrace at depths of 95 feet (29 meters) or greater is dominated by black sea urchins (*Diadema* sp. and *Echinothrix diadema*). Unidentified black holothurians (sea cucumbers) (*Holothuria atra* or *Holothuria nobilis*) were also common in rubble or sand patches below a depth of 95 feet (29 meters). A single *Acanthaster planci* (crown-of-thorns starfish) was observed feeding on a live coral colony. A single pearl oyster, *Pinctada radiata*, was observed at a depth of 100 feet (30 meters) on the seaward reef slope. The presence of *P. radiata* is somewhat unusual, as this species is relatively uncommon and normally occurs in shallow estuarine waters.

The introduced seagrass, *Halophila discipiens,* was observed in sandy areas. This species is believed to be a recent introduction into Hawaiian waters, its normal range being tropical waters to the southwest (Foster, personal communication). This species is taxonomically similar to the native *Halophilia hawaiiana*, which was not observed in the survey area. Both species may provide forage for the green sea turtle (*Chelonia mydas*).

Table J-3: Checklist Of Fishes, Reef Runway Shallow-Water Recovery Site*

Family Muraenidae (Moray Eels)
Gymnothorax flavimarginatus *(Yellow-margined moray)*
Gymnothorax undulatus (Undulated moray)

Family Aulostomidae (Trumpetfishes)
Aulostomus chinensis *(Trumpetfish)*

Family Holocentridae (Squirrelfishes and Soldierfishes)
Myripristis kuntee *(Pearly soldierfish; Shoulderbar soldierfish)*

Family Serranidae (Groupers)
Cephalopholis argus *(Blue-spotted grouper)***

Family Lutjanidae (Snappers)
Lutjanus kasmira (Bluelined snapper)**

Family Mullidae (Goatfishes)
Mulloides vanicolensis *(Yellowfin goatfish)*
Parupeneus multifasciatus *(Multibarred goatfish)*

Family Chaetodontidae (Butterflyfishes)
Chaetodon quadrimaculatus (Fourspot butterflyfish)
Chaetodon miliaris *(Milletseed butterflyfish)*
Chaetodon lineolatus (Lined butterflyfish)
Chaetodon ornatissimus (Ornate butterflyfish)
Chaetodon multicinctus (Multiband butterflyfish)

Family Pomacentridae (Damselfishes)
Dascyllus albisella (Hawaiian dascyllus)

Family Labridae (Wrasses)
Bodianus bilunulatus *(Hawaiian hogfish)*
Thalassoma duperrey (Saddle wrasse)
Thalassolma ballieui (Blacktail wrasse)
Gomphosus varius (Bird wrasse)

Family Scaridae (Parrotfishes)
Scarus sordidus (Bullethead parrotfish)
Scarus rubroviolaceus (Redlip parrotfish)

Family Zanclidae (Moorish Idol)
Zanclus cornutus (Moorish idol)

Family Acanthuridae (Surgeonfishes and Unicornfishes)
Acanthurus triostegus (Convict tang)
Acanthurus leucoparius (Whitebar surgeonfish)
Acanthurus olivaceus (Orangeband surgeonfish)
Acanthurus nigroris (Bluelined surgeonfish)
Naso lituratus (Orangespine unicornfish)
Naso hexacanthus (Sleek unicornfish)

Table J-3: Checklist Of Fishes, Reef Runway Shallow-Water Recovery Site* (Continued)

Family Balistidae (Triggerfishes)
Rhinecanthus rectangulus (Reef triggerfish)
Melichthys vidua (Pinktail durgon)
Sufflamen bursa (Lei triggerfish)

Family Ostraciidae (Trunkfishes)
Lactoria fornasini (Thornback cowfish)

Family Tetraodontidae (Puffers)
Arothron hispidus (Stripebelly puffer)

Family Carangidae (Jacks/Trevallies)
Decapterus macarellus *(Mackerel scad)*

* Checklist provided by John J. Naughton, Pacific Islands Environmental Coordinator, National Marine Fisheries Service, Southwest Region, Honolulu, Hawaii. Data from dives conducted on April 25, 2001, and May 2, 2001.

** Introduced species

At the expanded Reef Runway shallow-water recovery site, the expansive terrace that occurs between the 60 and 70-foot (18 – 21 meter) depth contours is characterized by a diversity of habitats, including limestone rubble, sand, sand and algae patches, sand-veneered limestone, and live and dead coral outcrops (Figure J-12). Surface features and habitats differ significantly across the terrace due to the occurrence of surge channels that were once a part of the Keehi Lagoon fringing reef (the latter destroyed by Reef Runway filling). During periods of heavy ocean swell and wave action, rubble and corals from more biologically diverse inshore habitats are likely transported seaward and down-slope and deposited onto the terrace. Areas on the terrace in proximity to what appear to be surge channels generally demonstrate greater limestone rubble accumulations, as well as more live and dead coral coverage, than other areas at some distance from surge channels. Unconsolidated sands dominate the terrace substrate in areas away from surge channel outlets.

Corals are common on the terrace in areas where limestone rubble provides a solid substrate for coral larval attachment and growth. *Pocillopora meandrina* (cauliflower coral) is the most abundant coral observed in the study area with estimated coverage averaging less than 1 percent, though occasionally demonstrating up to 30 percent coverage along the escarpment bordering the north side of the terrace and on vertical to near vertical slopes within surge channels. *P. meandrina* occasionally accounts for an estimated 90 percent coverage in localized areas at depths less than 90 feet (27 meters). Areas with high coral coverage are infrequent and are generally restricted to narrow escarpments with steep limestone or rubble slopes.

Mound-shaped *Porites lobata* (lobe coral) and *Porites compressa* (finger coral) are also conspicuous on the terrace, as are colonies of *Pocillopora eydouxi* (antler coral). The prostrate, encrusting growth form *P. lobata* is also occasionally observed in areas dominated by coral rubble at water depths above 95 feet (29 meters). Colonies of bracket-forming *Montipora* spp. was also occasionally observed, but was generally uncommon on the terrace.

The escarpment located between the 80 and 90-foot (24 - 27 meter) depth contours is a zone of dense coral coverage. Coral coverage along this narrow escarpment ranges from an estimated 40 to 90 percent along transects 18, 35b, and 36 b. These coral stands were generally composed of a mixed community of *P. meandrina, P. compressa, P. lobata, Montipora* sp., and *P. eydouxi*. A diverse coral community demonstrating approximately 80 percent coverage also occurs at a depth of about 50 feet (15 meters) on transect 30.

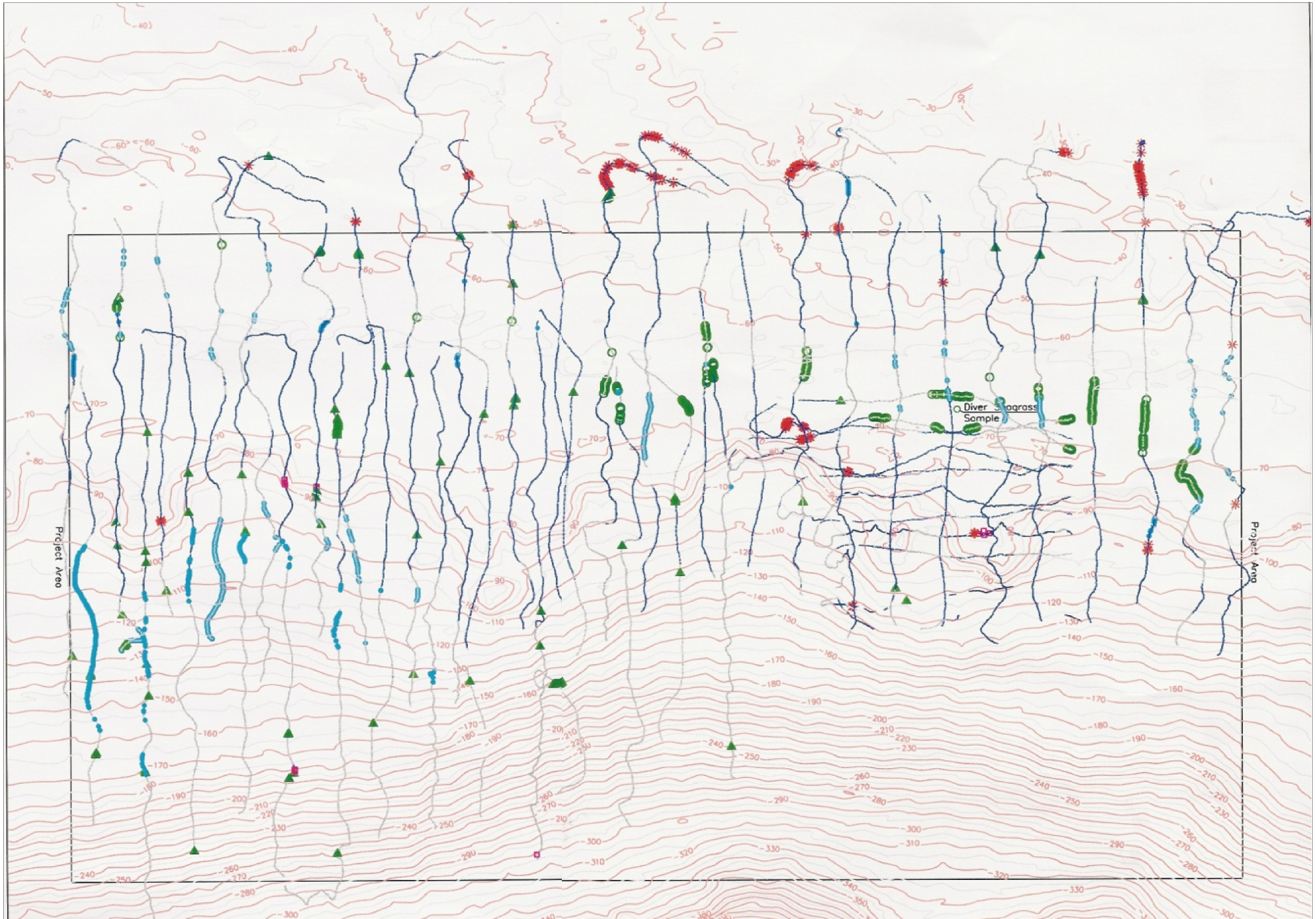
The deepest live coral colony observed during the surveys was a single bracket-forming *Montipora* spp. colony that was observed at a depth of 165 feet (50 meters) on transect 30b. Corals are rare at depths in excess of 120 feet (37 meters). The few live colonies observed at depths in excess of 120 feet (37 meters) were generally small; their presence at these depths possibly resulting from storm wave deposition.

Fishes associated with the reef terrace included small coral-associated species that were generally found hovering over or in the vicinity of live coral colonies. A total of 33 species of fish representing 16 families were recorded during dive surveys (describedin section 4.1.3). Families observed during May 19 and 23, 2001 surveys included chaetodontids (butterflyfishes), pomacentrids (damselfishes), labrids (wrasses), scarids (parrotfishes), acanthurids (surgeonfishes), balistids (triggerfishes), mullidae (goatfishes) and the zanclid (one species constitutes the family Zanclidae), *Zanclus cornutus*. The most abundant fish observed in the study area was *Dascyllus albisella* (Hawaiian dascyllus). *D. albisella* aggregations were often numerous hovering over or in the vicinity of live *P. eydouxi* corals at depths between approximately 50 feet (15 meters) and 120 feet (37 meters).

A dense assemblage of *Diadema* spp. (black sea urchin), numbering in the thousands, was observed on a limestone slope at a depth of 70 feet (21 meters) on transect 35b. Although urchins were common on limestone and rubble substrates throughout the study area, the density of this aggregation is unusual. The aggregation occurred in a band approximately 15 feet (5 meters) wide along a corridor estimated to be at least 30 feet (9 meters) long. The density of this aggregation is estimated at 100 per square meter. A single *Acanthaster planci* (crown-of-thorns starfish [sea star]) was observed on a live coral colony on transect 27b at a depth of 65 feet (20 meters). A single sea star, possibly *Mithrodia fisheri*, was observed on transect 36b at a depth of approximately 190 feet (58 meters).

Macro-algae and the introduced seagrass *Halophilia discipiens* were widely distributed in sandy areas on the reef terrace with the greatest densities occurring on the east side of the grid (transects 15 through 26). *H. discipiens* samples were not collected for taxonomic identification during the May 19 and 23, 2001 surveys. It has been assumed, on the basis of water depths and habitat similarities, to be the same seagrass identified by U.S. Fish and Wildlife Service taxonomists during the earlier surveys (Appendix J, Part 1).

Expanded Area Reef Runway Benthic Habitats



Source: Pentec, 2001; Sea Engineering, 2001

LEGEND

Live Corel
Corel Rubble
Sand
Seagrass
Algae
Debris
Ballast

0 75 150 Meters
0 246 492 Feet
NORTH

Figure J-12

An unidentified tube-dwelling, mound-building, nocturnal terebellid (family Terebellidae) polychaete worm dominates the infauna at water depths between 170 and 260 feet (52 – 79 meters). One isolated assemblage was also observed on transect 34b at a depth of 140 feet (43 meters). Terebellid densities ranged from an estimated 1 to 3 per square meter at water depths between 170 and 260 feet (52 – 79 meters). Terebellid density was an estimated 9 per square meter on transect 34b. Although individual worms were not observed during the diurnal surveys, their presence is readily discernible in the form of tentacle tracks in bottom sediments that radiate out from an elevated cone in a distinctive spoke-like pattern. Long contractile tentacles are a unique feeding organ found in many terebellid worms.

No other discernible benthic or epibenthic macrofauna, or infauna were observed at depths between 260 feet (79 meters) and 300 feet (91 meters), though irregular to sometimes linear tracks were occasionally observed on the substrate at water depths between 170 and 260 feet (52 – 79 meters). These tracks, which disturb the substrate surface layer, may result from gastropod (snail) foraging or the movement or grazing activities of other benthic invertebrates.

Accidental disturbances to the seafloor substrate by the camera housing during illuminated surveys conducted on transect 24b indicated the presence of a thin brownish-green mat at depths in excess of 170 feet (52 meters). Such mats are often composed of living and dead diatoms, zooplankton, phytoplankton, organic detritus, and heterotrophic bacteria.

Small fragments of detached macro-algae were occasionally observed at depths between 260 and 300 feet (70 – 91 meters). These macro-algae likely originated in shallow inshore areas and were transported by water currents to deeper offshore waters where they eventually settled to the bottom.

Swarms of macroscopic zooplankton were occasionally detected in the water column within 10 to 15 feet (3 - 5 meters) of the bottom at depths between 260 and 300 feet (70 – 91 meters). Zooplankton was particularly noticeable under artificial light illumination on transect 24b. They were less noticeable, though still discernible at water depths between 260 and 300 feet (70 – 91 meters) under ambient light conditions.

Fish were generally rare below a depth of 130 feet (40 meters) because of the absence of coral reef habitat. However, a mixed school of at least twenty *Z. cornutus* (moorish idols) and several *Chaetodon fremblii* (bluestripe butterflyfish) was observed at a depth of 170 feet (52 meters) on Transect 34b. Both species would normally be found in coral reef habitats. Demonstrating somewhat unusual behavior, the mixed school of *Z. cornutus* and *C. fremblii* swam ahead and to the side of the camera housing for over 20 seconds.

An adult *Sphyraena barracuda* (great barracuda) was recorded on Transect 35b at a depth of 230 feet. This individual had an estimated length of approximately 4 feet (1.2 meters) and displayed what appeared to be aggressive behavior toward the passing camera housing.

4.1.4 Threatened and Endangered Species

A single pod of humpback whales (*Megaptera evangelae*), comprising two to three individuals, was observed spouting on April 22, 2001, about 2 miles (3,200 meters) offshore of the Reef Runway shallow-water recovery area. It is somewhat unusual for humpback whales to be observed in late April in Hawaiian waters (Oishi, personal communication). The pod appeared to be navigating in a westerly direction towards the Barbers Point area and was likely enroute to summer feeding areas in the North Pacific Ocean.

At the expanded Reef Runway shallow-water recovery site, an adult green sea turtle (*Chelonia mydas*) was recorded on transect 30 at a depth of 70 feet (21 meters) on May 19, 2001. This individual appeared to be resting on the reef terrace in an area sheltered by coral outcrops.

4.2. EWA BEACH SHALLOW-WATER RECOVERY SITE

4.2.1 Overview

The most extensive deposition of reef limestone on Oahu during a higher stand of the sea occurred over the Ewa plain. Deep borings conducted 600 feet (182 meters) behind the shoreline of Ewa Beach penetrated a 1,000-foot (303-meter) thick deposit of raised reef, sand, lagoonal muds and alluvial muds before reaching the basaltic core of Oahu. Ancient high and lower stands of the sea have been inferred from these results (U.S. Army Engineer District, 1979).

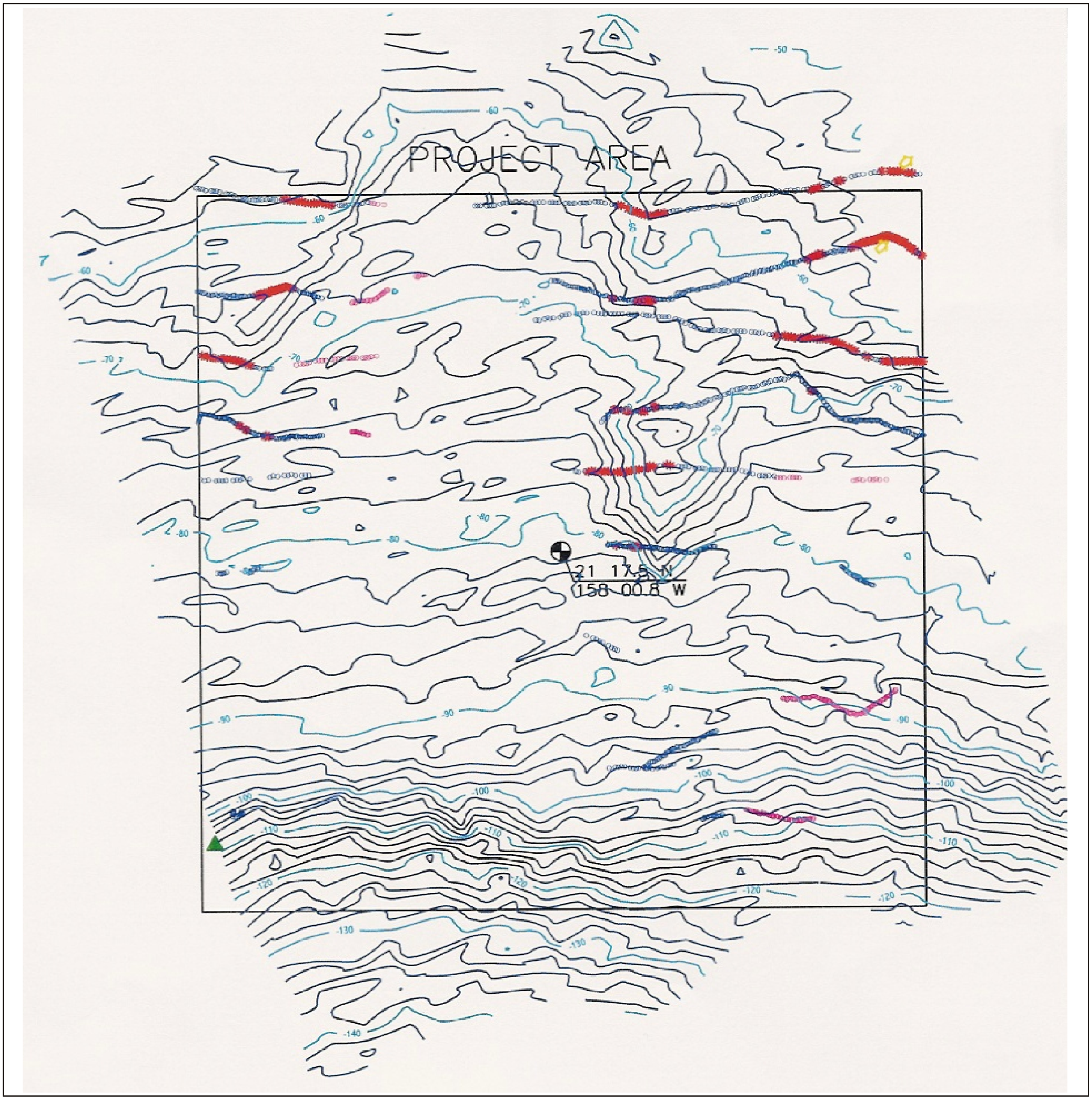
The Ewa shoreline is a narrow and straight sand beach with dozens of residential homes lining the back beach area. The beachfront is steep and is sometimes backed by a storm-built gravel berm. The coast is subject to high surf and tsunami flooding. The tsunami of 1960 caused a run-up to 9 feet (3 meters) above sea level (U.S. Army Engineer District, 1979).

4.2.2 Physical Setting

The submerged reef that extends seaward from the Ewa coast is widest fronting Ewa Beach. Water depth increases very gradually offshore with the reef edge located about 4,500 feet (1,364 meters) offshore. Limestone rubble and sand litter the reef terraces found offshore at depths greater than 50 feet (15 meters) (U.S. Army Engineer District, 1979). Vertical relief is greatest at water depths of 65 to 80 feet (20 to 24 meters) where live corals are abundant. Below approximately 85 feet (26 meters), the substrate is composed of a mix of ancient reef limestone, coral rubble, sand, and occasional live coral outcrops. Sand deposits are sometimes deep and vertical relief is provided by cone- shaped mounds resulting from the activities of unidentified burrowing organisms. The seaward slope increases significantly at a depth of 98 feet (30 meters) and reaches a depth of 124 feet (38 meters) at the seaward terminus of the survey grid.

4.2.3 Biota

Video surveys conducted on April 22, 2001 indicated that corals ranged from locally abundant on the northern inshore reef slope at the Ewa Beach shallow-water recovery site, to uncommon on the broad sandy slopes on the south (seaward) side of the site (Figure J-13). Coral coverage ranges from 80 to 90 percent at depths between 58 and 78 feet (18 and 24 meters) to less than 1



LEGEND

- Live Coral
- Coral Rubble
- Algae
- Debris
- Turtle

NORTH

0 35 70 Meters

0 114 228 Feet

Ewa Beach Benthic Habitats

Figure J-13

J_13EwaBenthic

percent in water depths from 78 to 120 feet (24 to 36 meters). The coral community is dominated by *P. meandrina, P. lobata* and *P. compressa.* Substrate depressions are littered with massive mounds of fresh coral rubble and coral shards composed primarily of *P. compressa.*

A diverse and abundant fish fauna is associated with areas of high coral coverage and vertical relief. During the April 22, 2001 survey the most common families represented were surgeonfishes (acanthurids), butterflyfishes (chaetodontids), damselfishes (pomacentrids), wrasses (labrids), triggerfishes (balistids), and moorish idols (zanclidae).

Earlier studies identified 59 species of fishes in the vicinity of Ewa Beach, of which 20 were regarded as abundant (U.S. Army Engineer District, 1979).

Common invertebrates associated with the Ewa Beach shallow-water recovery site included holothurians, echinoids (rock-boring and black sea urchins), and sponges.

4.2.4 Threatened and Endangered Species

Green sea turtles were common in the study area on the afternoon of April 22, 2001. At least four adult green sea turtles were observed basking on the surface and two additional turtles were recorded resting on the seafloor at depths of 52 and 58 feet (16 and 18 meters) during videotape transects.

4.3 WAIANAE COAST SHALLOW-WATER RECOVERY SITE

4.3.1 Overview

The Waianae Coast shallow-water recovery site is situated north of Barbers Point Harbor and offshore of the Ko Olina Resort. The Waianae Coast site is located on the leeward side of the Waianae Mountains, its protected location providing many opportunities for surfing, swimming and fishing. Commercial and recreational diving is also popular due to the prevailing clear water and extensive coral reef development. The natural shoreline inshore of the study site was modified during construction of Ko Olina Resort to create four protected swimming lagoons. Other shoreline modifications occurred during construction of Barbers Point Harbor and Channel.

4.3.2 Physical Setting

The Waianae Coast shallow-water recovery site is dominated by unconsolidated sand that occurs along the largely flat to slightly undulating seaward reef slope. Water depths range from approximately 40 feet (12 meters) at the northeast (landward) side of the study area to 92 feet (28 meters) on the southwest (seaward) side. The substrate is dominated by unconsolidated sand with occasional patches of limestone rubble, except on the northeast (landward) side of the study area where a well developed coral reef occurs. Vertical relief in areas of coral development is about 3 to 5 feet (1 to 2 meters); elsewhere it is limited to just a few inches of current-rippled sand.

4.3.3 Biota

Inshore areas at depths between 40 and 70 feet (12 to 21 meters) demonstrate a modestly diverse coral community with coverage in localized areas ranging from an estimated 40 to 50 percent (Figure J-14). *P. meandrina* is the dominant coral, followed by *P. lobata, P. compressa,* and rarely, *Montipora* sp. (*verrucosa?*). Upright flattened branches on several colonies were suggestive of *P. eydouxi,* but the presence of this species was not confirmed at this site. Coral coverage declines markedly below depths of 75 feet (23 meters) where expansive, gently sloping sand flats harbor only an occasional colony of *P. meandrina* on an otherwise featureless sand bottom.

Fishes are rare across the broad sandy bottom, except where an occasional colony of *P. meandrina* or debris provides habitat. The Hawaiian dascyllus, *D. albisella,* is often abundant in such areas. Small schools of pennantfish (*Heniochus diphreutes)* were observed on two occasions. Two Hawaiian cleaner wrasses (*Labroides phthirophagus)* were encountered at a depth of 90 feet (27 meters) on a "cleaning station" whose only physical attribute was a short length of coiled steel cable. Moorish idols (*Zanclus cornutu*s) and several unidentified damselfishes (pomacentrids) and surgeonfishes (acanthurids) were observed being attended (cleaned) by the cleaner wrasses. Surgeonfishes (acanthurids), triggerfishes (balistids), wrasses, (labrids), and butterflyfishes (chaetodontids) comprised the remaining fish fauna.

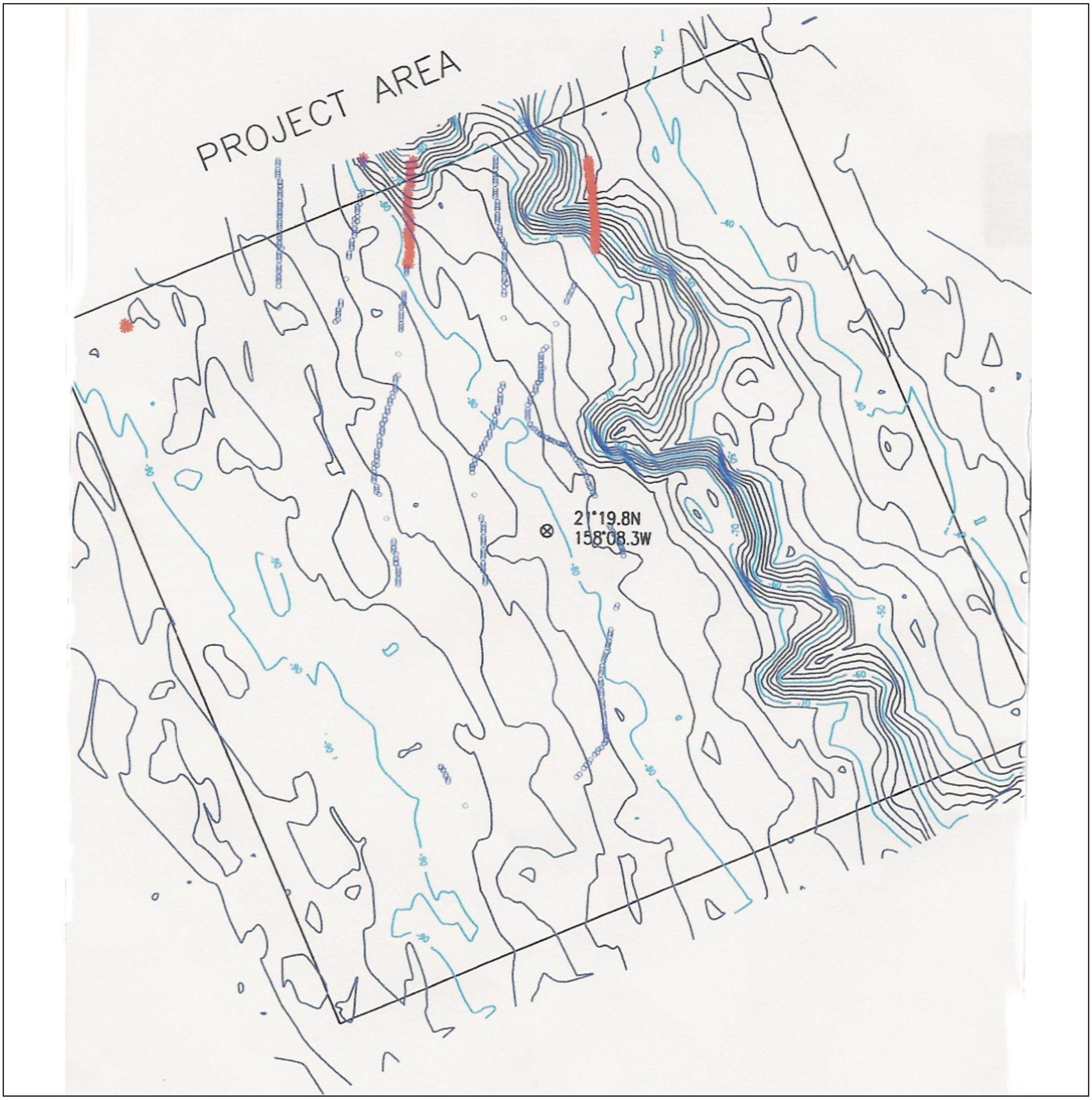
Earlier surveys conducted in the vicinity of Barbers Point Harbor identified 57 species of fish associated with large boulders and a "drop off" at a depth of 45 feet (14 meters). The most abundant species were the smalltail wrass (*Pseudojuloides cerasinus),* fantail filefish *(Pervagor spilosoma),* and the blackfin chromis (*Chromis vanderbilti)* (U.S. Army Engineer District, 1979).

Common invertebrates observed within the proposed Waianae Coast shallow-water recovery site included black sea urchins and unidentified sea cucumbers. Both species were associated with coral rubble patches.

An unidentified filamentous green algae that grows upright with delicate intertwined wispy filaments is common over wide areas of sandy substrate at depths between 75 and 92 feet (23 and 28 meters).

4.3.4 Threatened and Endangered Species

One green sea turtle was observed during marine surveys conducted on April 24, 2001. NMFS staff has indicated that the green sea turtles is abundant in the area and frequently utilize caves and ledges along the fringing reef as a resting area (Naughton, personal communication).



LEGEND

- Live Coral
- Coral Rubble
- Algae
- Debris

NORTH

0 30 60 Meters
0 98 196 Feet

Waianae Coast Benthic Habitats

Figure J-14

J_14WaianeaHabitat

5.0 DISCUSSION

The nature and extent of marine biological community development in Hawaiian waters is largely determined by the type of bottom substrate, water currents, wave exposure, and depth. Localized natural and manmade disturbances such as *tsunamis*, volcanic eruptions, coastal development, freshwater flooding, and sediment loads associated with natural as well as agricultural runoff also influence the composition of near shore biological communities.

Hawaii has three basic types of coral reef environments (Fielding and Robinson, 1989). The first type of coral reef environment is dominated by *P. meandrina. P. meandrina* is found in areas with high wave energy and strong sunlight. It is a pioneer species on disturbed substrates and the dominant coral in shallow areas exposed to heavy wave action.

The second type of coral reef environment is characterized by *P. lobata.* This species is found in calmer waters than *P. meandrina.* It is normally found in shallow waters along semi-protected coastlines, or in deeper waters along wave-exposed coastlines.

The third type of coral reef environment is dominated by *P. compressa.* This species is found only in the most protected waters because of its fragile branching growth form. It normally occurs at water depths below those that are considered optimal for either *P. meandrina* or *P. lobata.* Therefore, *P. compressa* may occur in shallow protected bays or on the deeper ocean side of fringing reefs, such as are found off the leeward coast of Oahu.

Video surveys conducted at the expanded Reef Runway shallow-water recovery site showed moderately diverse coral reef habitats in shallow, inshore areas, with coral diversity and coverage decreasing with depth. Exceptions to this generalized pattern occur on narrow slopes, escarpments, and in surge channels where coverage in localized areas ranges between 40 and 90 percent. Areas with coral coverage exceeding 40 percent were uncommon.

Coral zonation was evident in some survey locations with *P. meandrina,* and *P. lobata* representing the dominant shallow-water species (the latter represented by both hemispherical and encrusting growth forms). *P. compressa, P. eydouxi,* and *Montipora* spp. were normally found in mid- to deep-water locations, but rarely exceeded the coverage provided by *P. meandrina*. The lack of obvious zonation patterns in these areas may result from storm wave energy that can detach or fragment corals growing in shallow water and transport them into deeper water. Limestone rubble accumulations and coral development on the terrace seaward of fringing reef surge channels suggest that the channels are a conduit for the transport of coral rubble, detached corals, and coral shards from shallow to deep water.

The *P. compressa* coral community shows evidence of storm wave damage in some locations, though this species was generally uncommon at all depths along the Reef Runway transects. Areas of apparent *P. compressa* destruction may be the result of storm-wave damage associated with recent regional cyclonic disturbances (e.g., Hurricane *Iwa* and/or Hurricane *Iniki*).

Corals are rare at depths in excess of 120 feet (37 meters) and those present are likely the result of storm wave transport and deposition. Finding a single large bracket-forming colony of *Montipora* spp. in sand at a depth of 165 feet (50 meters) was unusual. Even the hardiest corals rarely settle or survive on substrates dominated by unconsolidated sand. It is assumed that this isolated colony is the result of storm wave deposition.

Regardless of the site selected for mooring of the surface recovery vessel and shallow-water crewmember recovery operations, certain unavoidable impacts upon the marine environment are expected. The following sections identify potential project impacts on the marine environment that would be expected within the expanded Reef Runway shallow-water recovery site.

5.1 Mooring and Diver/Diver Support Activities at the Shallow-water Recovery Sites

Temporary mooring of the recovery vessel and diving barge, berthing of the *Ehime Maru* on the seafloor, and diver and diver-support activities are expected to disturb bottom substrates and biotic communities of generally low biological diversity and density. These disturbances would effect the habitat of various benthic organisms, suspend sediments in the water column, increase turbidity, reduce light penetration, and result in elevated nutrient levels in the water column. These disturbances are expected to result in only temporary and localized reductions in water quality. However, suspension of bottom sediments could stress coral colonies as a result of sediment deposition on coral polyps. Damage to corals would be greater on slopes and escarpments that demonstrate high coral coverage.

Disturbances to live corals could result from surface vessel anchoring and deployment and positioning of anchors, anchor chains, and mooring cables on the seafloor. In general, coral impacts should be minimal if anchors, mooring chains, and cables are positioned in a manner that would avoid slopes and escarpments at water depths above 95 feet (29 meters). At depths below approximately 120 feet (37 meters) impacts will be limited to a loss of or disturbances to infaunal polychaetes and other benthic organisms that are adapted to a detrital-based food chain. Corals and associated fish populations are rare at depths below 120 feet (37 meters). Thus, project activities at depths below 120 feet (37 meters) would not be expected to impact any significant area of coral development or reef fish habitat.

With the exception of escarpments and slopes, overall live coral coverage averages less than 1 percent throughout the survey area. Thus impacts to corals from mooring and diver-support activities are expected to be minor.

5.2 Oil/Fuel Release

An oil or fuel release could potentially affect the threatened green sea turtle. Although only one green sea turtle was observed within the Reef Runway survey grid, they have been observed resting along the Fort Kamehameha sewer outfall alignment in the Pearl Harbor Channel. Given the few green sea turtles that have been observed in the vicinity of the Reef Runway and Pearl Harbor Channel, and the resources available to remove any fuel or oil resulting from an accidental release, the likelihood is small for an oil release affecting the green sea turtle.

The impacts of a fuel or oil release on the marine ecosystem at the proposed shallow-water recovery sites will vary as a function of the type of hydrocarbon released, resources present, tide level, and type of substrate. Lubricating oils or fuels could be released from surface support vessels or from the *Ehime Maru*. Diesel fuel is relatively non-persistent and is expected to volatilize quickly as a function of prevailing winds, surface water and air temperatures, and water current patterns. Diesel fuel and lubricating oils would rise to the surface and would not be expected to impact benthic communities, though shoreline inter-tidal communities could be impacted. Oil that comes in contact with rubble or sand on the sea floor could result in localized areas that could prove toxic or inhibitory to benthic marine organisms. However, any sediment oiling would be detectable by divers and would be quickly removed. Given the Incident Action Plan resources that would be mobilized to contain and clean up any release, it is unlikely that a release could adversely impact sensitive benthic or intertidal communities.

Mangrove stands located on the north (Keehi Lagoon) side of the Reef Runway could be potentially affected by an oil release. Hawaiian mangroves are dominated by *Rhizophora mangle,* an introduced species that has successfully colonized intertidal and estuarine mudflats and sandflats throughout the state since its introduction in 1902, and *Bruguiera gymnorrhiza*, which was introduced from the Philippines in 1922 (Wester, 1981). A combination of their intertidal distribution and the presence of sub-aerial air-breathing roots (pneumatophores) make them potentially vulnerable to floating oil. However, given the resources that would be mobilized in the event of an accidental oil release, any disturbance to this community is considered remote.

Another potential source of oil is from vessel bilge waters. Emptied oil compartments can be used to adjust trim and ballast and can inadvertently be a source of oil pollution. However, strict adherence to the project's Incident Action Plan should preclude bilge discharges from representing a potential source of an oil release.

An oil or fuel release could affect the threatened green sea turtle at any of the proposed shallow-water recovery sites. Because of the number of basking or resting green sea turtles observed during surveys at the Ewa Beach shallow-water recovery site, the potential for turtle oiling is considered greater at Ewa Beach than at the other proposed sites. Although only one green sea turtle was observed during site surveys at the Waianae Coast shallow-water recovery site, they are reportedly common in the vicinity of the fringing reef (Naughton, personal communication). Green sea turtles have also been reported resting along the Fort Kamehameha sewer outfall alignment in the Pearl Harbor Channel, which is near the proposed Reef Runway shallow-water recovery site. However, given the resources available to mobilize and remove any fuel or oil resulting from an accidental release, the likelihood is small of an oil release affecting green sea turtles at any proposed shallow-water recovery site.

5.3 Ciguatera

Physical disturbances to shallow-water benthic communities and reef substrates have been associated with outbreaks of ciguatera fish poisoning in Hawaii and elsewhere in the tropical and subtropical Pacific. The poisoning is caused by the dinoflagellate *Gambierdiscus toxicus* growing in high densities on macroscopic algae or other substrates that are consumed by herbivorous fish. The triggering mechanism for a ciguatera outbreak is not well understood. However, the toxin is amplified as it moves up the food chain from herbivorous to carnivorous fishes. Ciguatera can be mildly toxic to fish, with toxicity increasing in mammals, including humans. Outbreaks generally result from consumption of reef fishes such as adult carangids (jacks), sphyraenids (barracuda), and muraenids (moray eels). The chance of a ciguatera outbreak occurring as a direct or indirect result of project actions is considered negligible because of the limited amount of reef substrate disturbance that is anticipated, and the short duration of the recovery phase of the project.

5.4 Non-Indigenous Species Introductions

Mobilization of a deep-water recovery vessel from other parts of the world presents the opportunity for the accidental introduction of non-indigenous marine or estuarine species into Hawaiian waters. Marine or estuarine species associated with vessel bilge waters and fouling organisms attached to bilge water tanks or exterior hull surfaces could be released into Hawaiian waters where they could potentially become established. Hawaii has a history of accidental as well as purposeful marine species introductions, some of which have resulted in deleterious impacts to native marine and estuarine biota. The Hawaii State Government presently has no regulations governing non-indigenous species associated with vessel bilge waters (Oishi, personal communication). However, the International Maritime Organization (IMO) has established voluntary standards that recommend exchange of ballast water while at sea. It is anticipated that such standards will be followed for any vessels utilized in this project that originate in foreign ports.

6.0 RECOMMENDATIONS

On the basis of marine biological surveys conducted at three candidate shallow-water recovery sites (described in Appendix J, Part 1), the proposed Reef Runway shallow-water recovery site remains as the recommended location for crewmember recovery operations. This recommendation is based on the history of marine habitat losses and disturbances involving earlier Reef Runway construction, channel dredging, and reef and lagoon quarrying. These actions collectively decimated the former Keehi Lagoon fringing reef and its associated coral reef and reef flat habitats. Only remnants of the former Keehi Lagoon fringing reef exist outside of the study area. This recommendation is also based on the relative infrequent occurrence of the green sea turtle at the Reef Runway shallow-water recovery site compared to the other candidate shallow-water recovery sites.

There are no rare or sensitive benthic species or biological communities associated with the expanded Reef Runway shallow-water recovery site whose existence would be jeopardized by recovery vessel mooring, temporary seafloor berthing of the *Ehime Maru*, diving, or diving-support actions involved with crewmember recovery operations. Adherence to the project's Incident Action Plan would minimize, if not negate, any impacts to marine resources resulting from an oil or fuel release.

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APPENDIX J, PART 2

Marine Species List
Ehime Maru Shallow Water Site Inspection
Kevin Foster
U.S. Fish and Wildlife Service
Honolulu, Hawaii

Date: 4/25/01

Dive 1: Survey Area - Center transect in a south to north direction, from outer (seaward) boundary toward inner (landward) boundary.

Start Depth: 80 Feet
Finish Depth: 72 Feet
Time In: 10:00am
Time Out: 10:30am

Habitat Notes: Easterly Current, about 2 - 3 knots. Escarpment at seaward boundary (30-degree slope)...bottoms out at about 95 feet. Top of escarpment at 80 feet. Slope of reef landward of escarpment is about 5 degrees. Coral coverage ranges from 5 - about 25 percent (Visual/Qualitative Estimate).

Marine Species Observed

Common Name	Scientific Name (Genus/species)
Sponge	*Phorbas* sp.
Sponge	*Clathria* (Microciona) sp.
Christmas tree worm	*Spirobranchus giganteus*
Urchin	*Diadema* sp.
Urchin	*Echinothrix diadema*
Urchin	*E. calamaris*
Urchin	*Chondrocidaris gigantea*
Urchin	*Echinostrephus aciculatus*
Urchin	*Tripneustes gratilla*
Mussel	*Arca* sp.
Nudibranch	*Phyllidia varicosa*
Crab	*Trapezia ferruginea*
Coral	*Pocillopora meandrina*
Coral	*Porites lobata*
Coral	*P. compressa*
Coral	*Monitpora* sp.
Green Algae	*Neomeris annulata*
Red Algae	*Liagora* sp.

Dive 2: Survey Area - Inner (landward) boundary near center transect line.

Start Depth: 68 Feet
Finish Depth: 72 Feet
Time In: 12:10am
Time Out: 12:31am

Habitat Notes: Rubble/sand bottom. Coral Coverage about 15 percent (Visual/Qualitative Estimate). Current less than 1 knot.

Marine Species Observed

Common Name	Scientific Name (Genus/species)
Sponge	*Phorbas* sp.
Sponge	*Clathria* (Microciona) sp.
Christmas tree worm	*Spirobranchus giganteus*
Urchin	*Echinothrix diadema*
Urchin	*Chondrocidaris gigantea*
Urchin	*Echinostrephus aciculatus*
Urchin	*Tripneustes gratilla*
Oyster	*Pinctada radiata*
Mussel	*Arca* sp.
Crab	*Trapezia ferruginea*
Coral	*Pocillopora meandrina*
Coral	*Porites lobata*
Coral	*P. compressa*
Coral	*Monitpora* sp.
Green Algae	*Neomeris annulata*
Red Algae	*Asparagopsis taxiformis*
Seagrass	*Halophila discipiens* (Possibly Alien Species)
Gastropod	*Smaragdia bryanae* (endemic gastropod) *observe grazing evidence and capsule (reproductive case). The gastropod was collected from the seagrass *H. discipiens*.

Date: 5/2/01

Dive 1: Survey Area - Seaward Boundary, Western Quadrant. (21 degrees, 17.62 minutes North Latitude and 157 degrees 89.73 minutes West Longitude)

Start Depth: 90 Feet
Finish Depth: 82 Feet
Time In: 9:44am
Time Out: 10:01am

Habitat Notes: Current less than 1 knot. Rubble/Sand bottom. Pinnacle (20 percent coral Visual/qualitative Estimate).

Marine Species Observed

Common Name	Scientific Name (Genus/species)
Sponge	*Phorbas* sp.
Sponge	*Clathria* (Microciona) sp.
Christmas tree worm	*Spirobranchus giganteus*
Urchin	*Echinothrix diadema*
Urchin	*Chondrocidaris gigantea*
Urchin	*Tripneustes gratilla*
Coral	*Pocillopora meandrina*
Coral	*Porites lobata*
Coral	*P. compressa*
Coral	*Monitpora* sp.

Date: 5/2/01

Dive 1: Survey Area - Seaward Boundary, Western Quadrant.

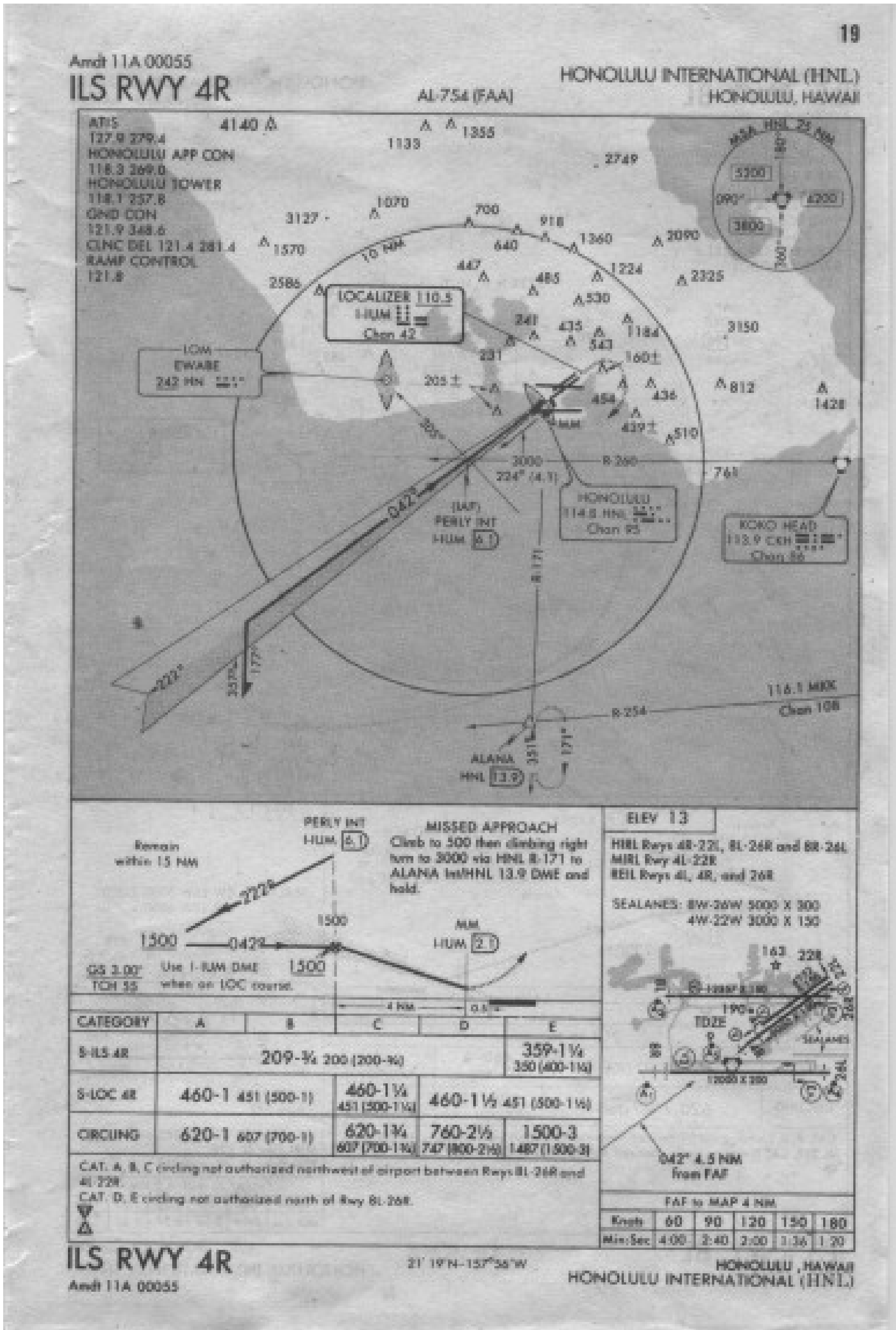
Start Depth: 100 Feet
Finish Depth: 90 Feet
Time In: 12:05pm
Time Out: 12:24pm

Habitat Notes: Current less than 1 knot. Rubble/Sand bottom…transition to 100 percent sand bottom at 100 feet. Slope 3 - 4 percent. Expansive flat to moderately sloping area. Excellent location for the Ehime Maru mission.

Marine Species Observed

Common Name	Scientific Name (Genus/species)
Seagrass	*Halophila discipiens* (Possibly Alien Species)
Gastropod	*Smaragdia bryanae* (endemic gastropod) *observe grazing evidence and capsule (reproductive case). The gastrod was collected from the seagrass *H. discipiens*.

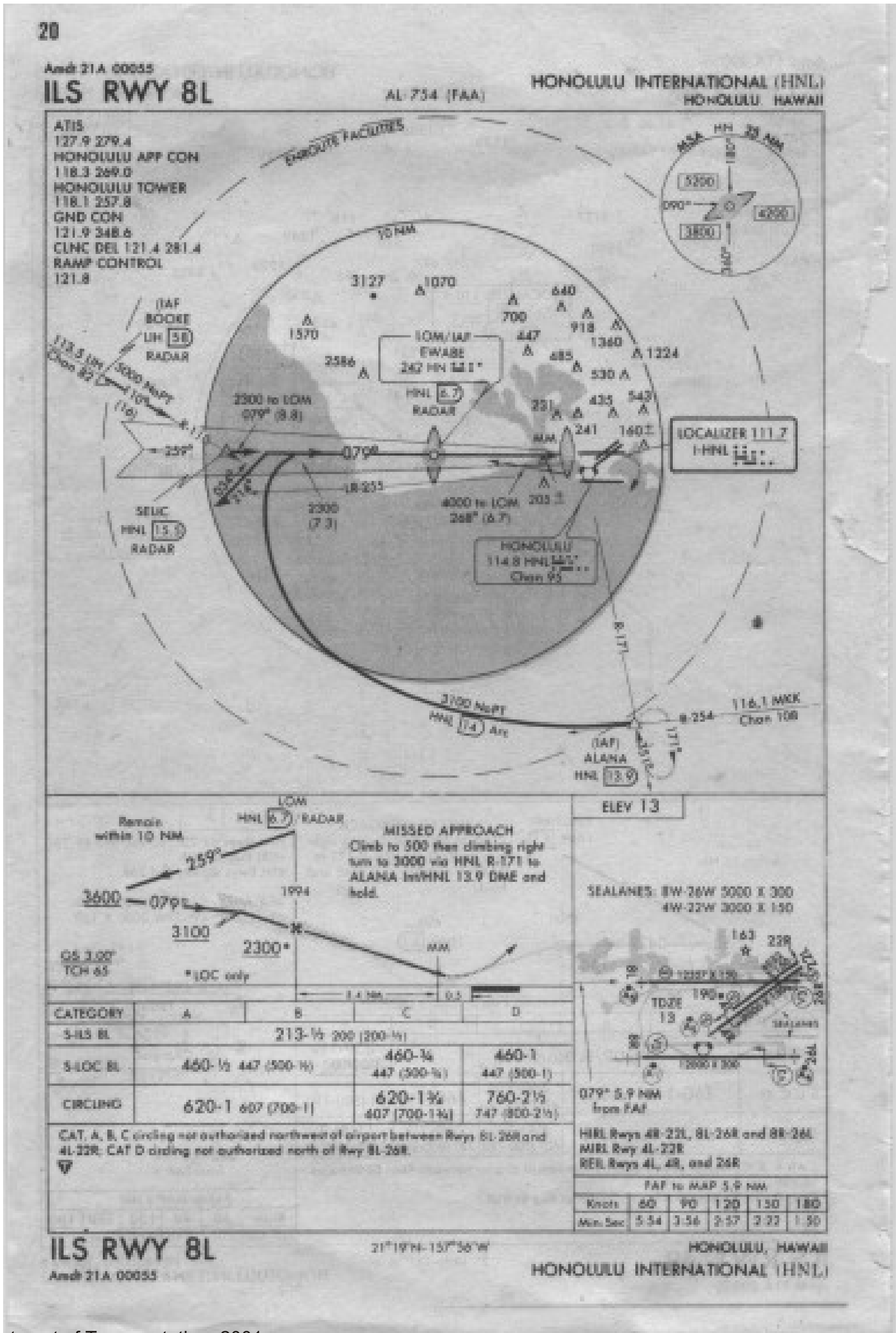
APPENDIX K
AIRSPACE DIAGRAMS



Source: U.S. Department of Transportation, 2001

Air Space Diagram (ILS RWY 4R)

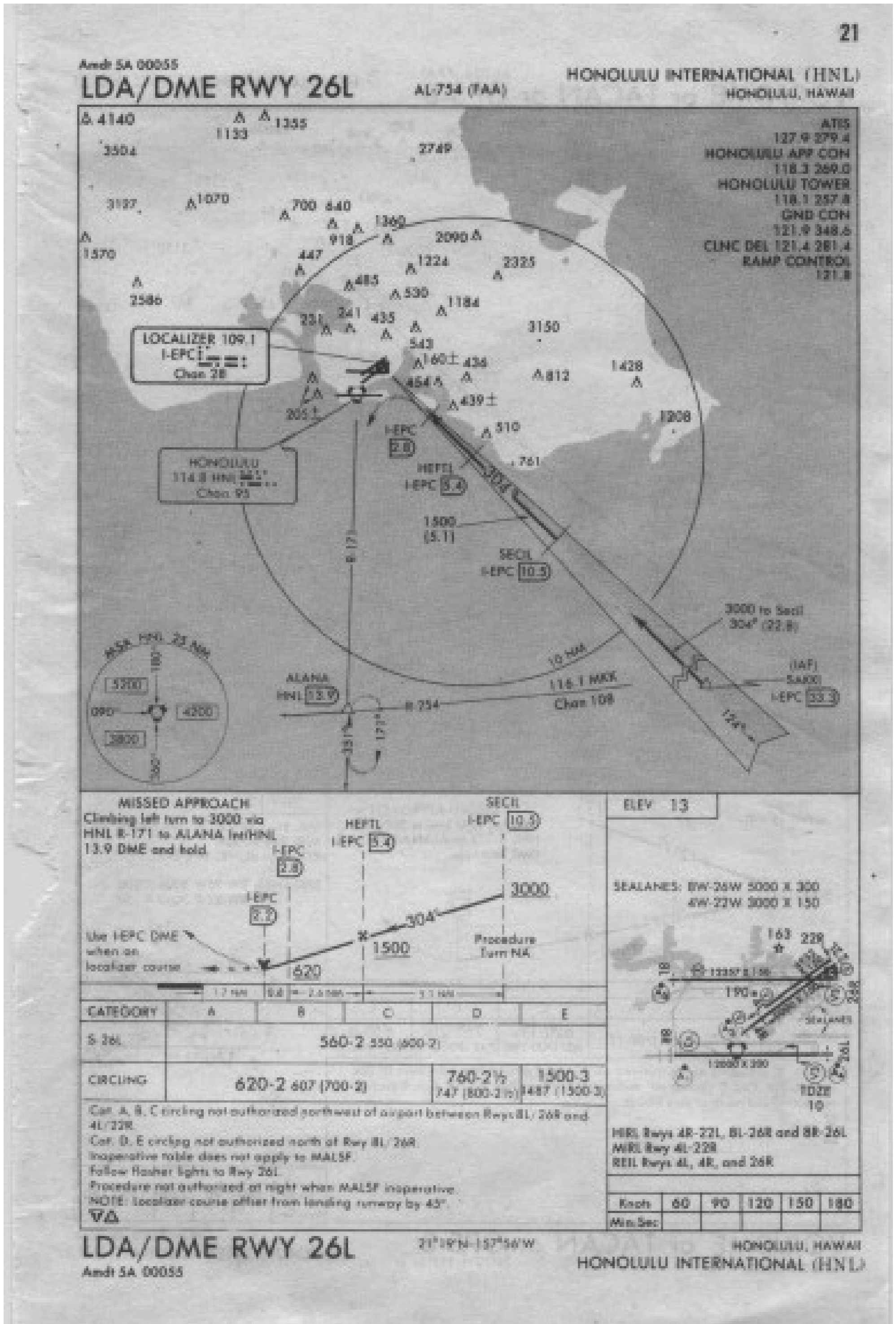
Figure K-1



Source: U.S. Department of Transportation, 2001

Air Space Diagram (ILS RWY 8L)

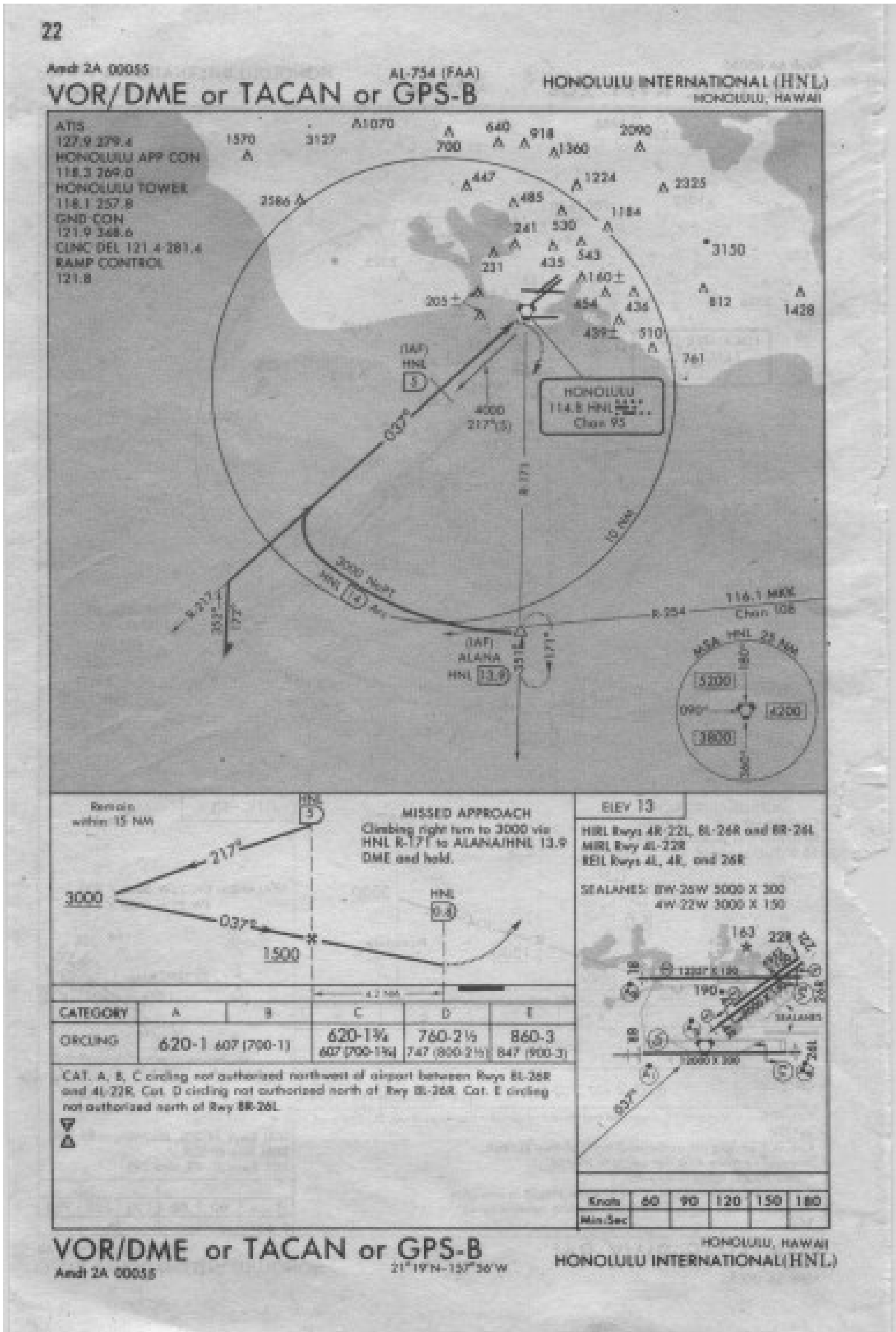
Figure K-2



Source: U.S. Department of Transportation, 2001

Air Space Diagram (LDA/DME RWY 26L)

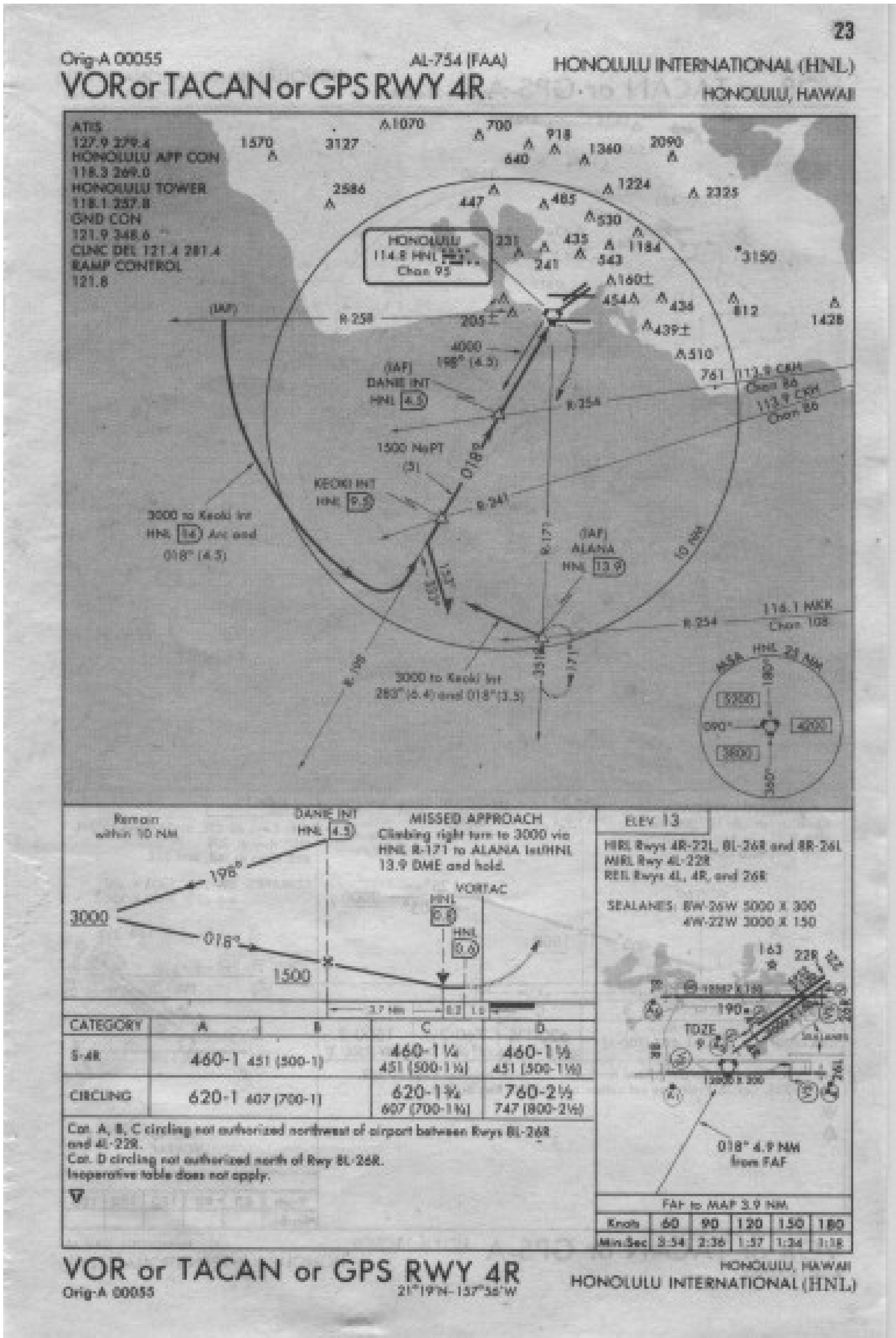
Figure K-3



Source: U.S. Department of Transportation, 2001

Air Space Diagram (VOR/DME or TACAN or GPS-B)

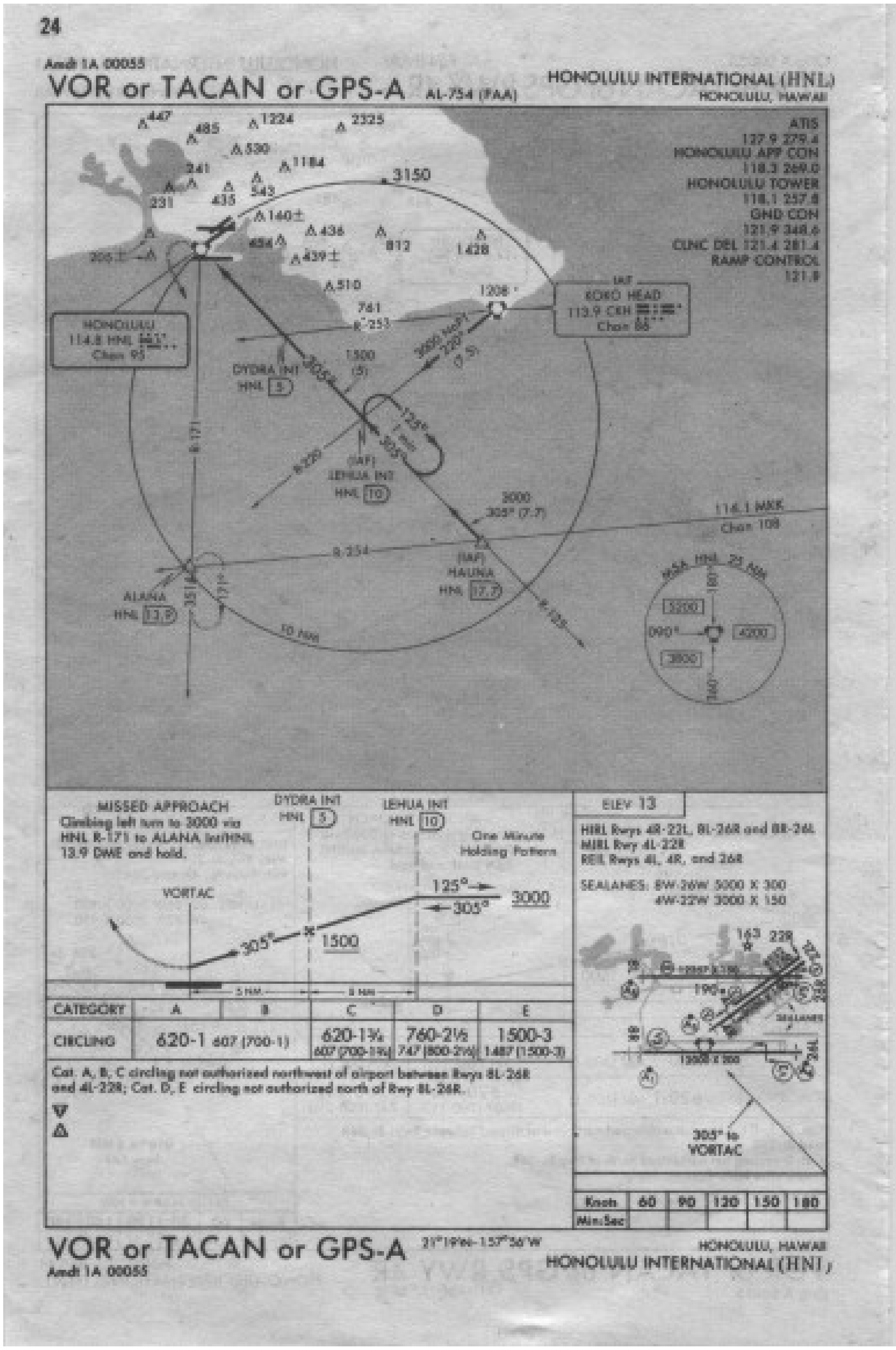
Figure K-4



Source: U.S. Department of Transportation, 2001

Air Space Diagram (VOR or TACAN or RWY 4R)

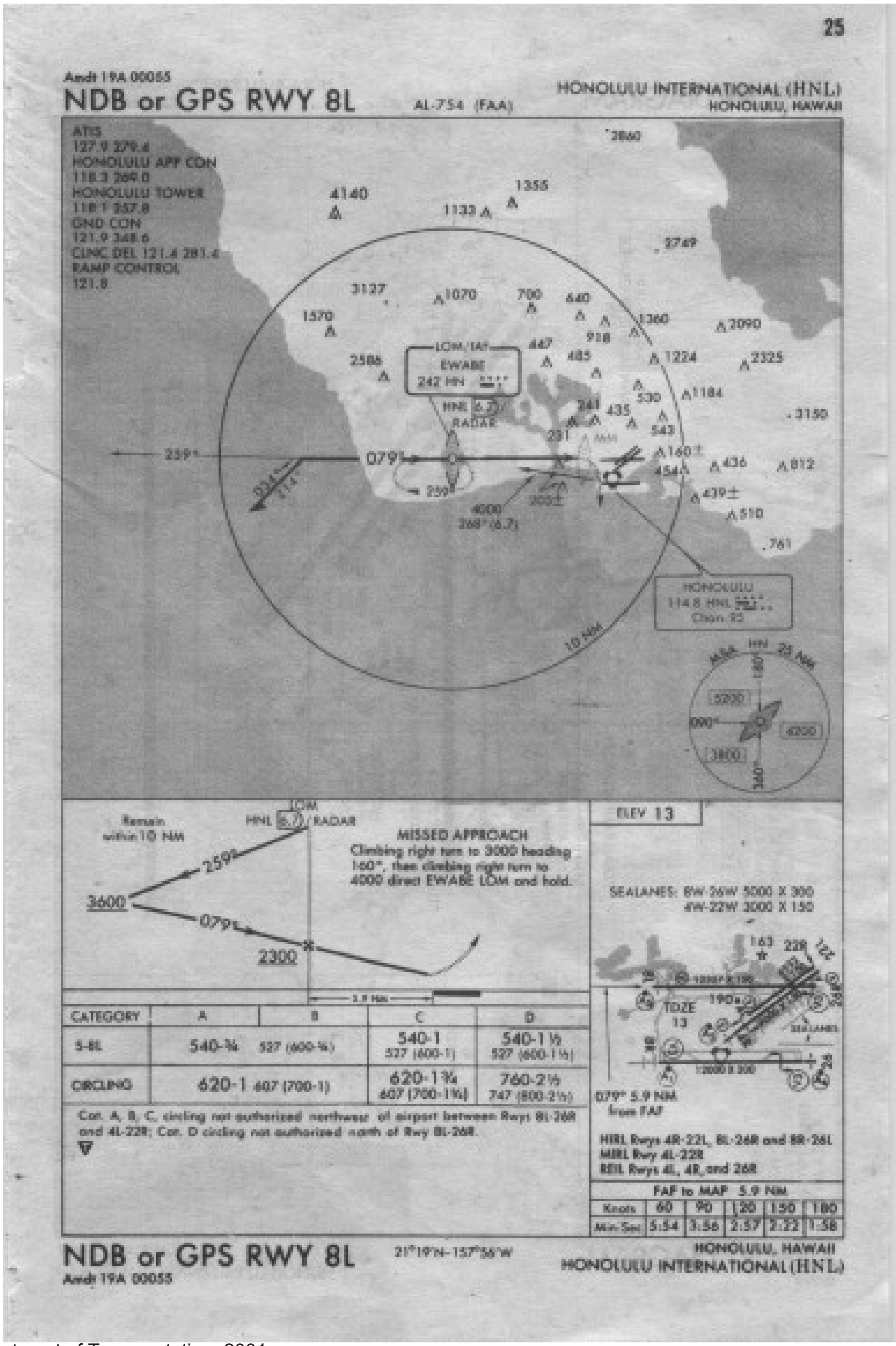
Figure K-5



Source: U.S. Department of Transportation, 2001

Air Space Diagram (VOR or TACAN or GPS-A)

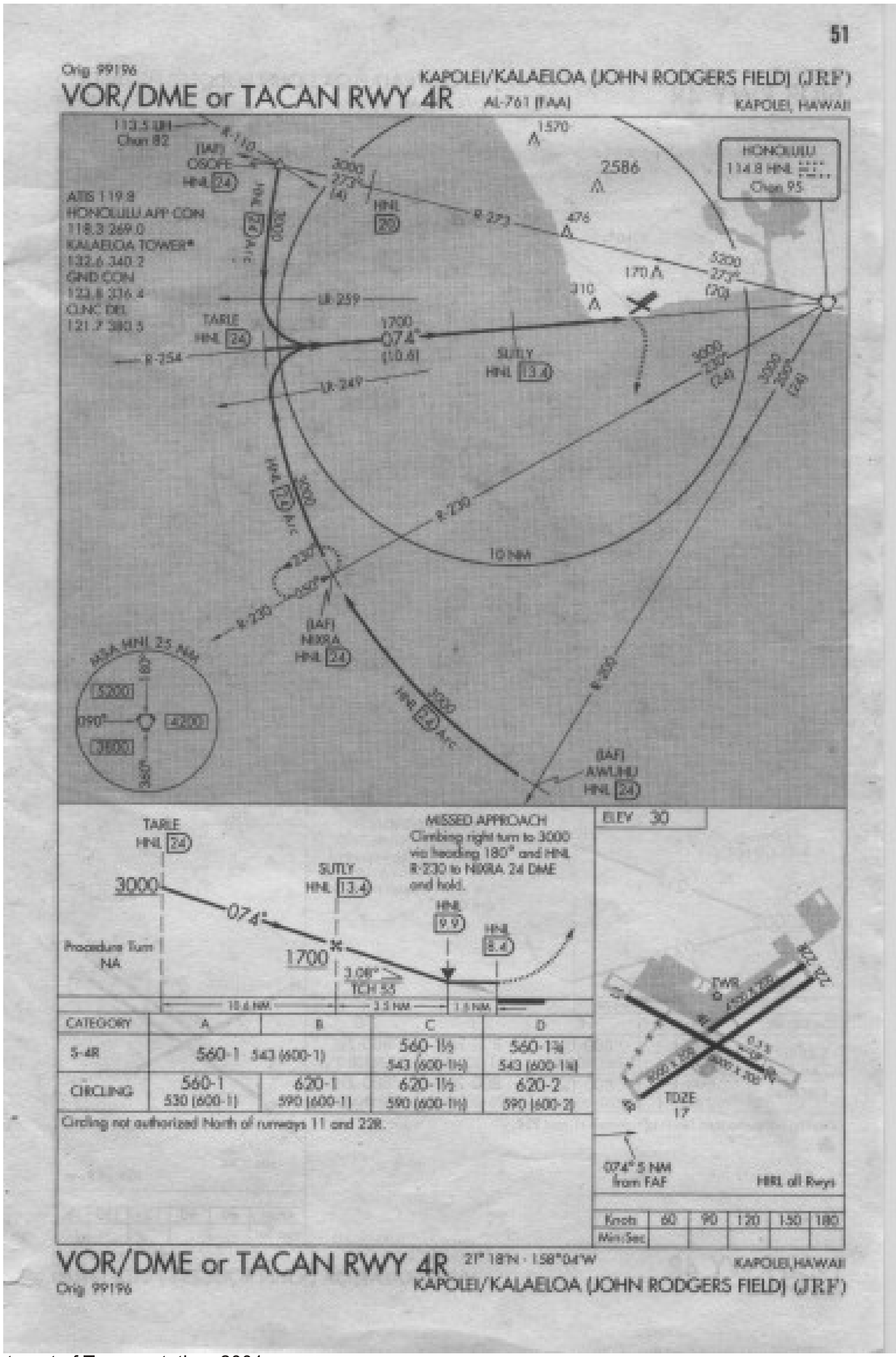
Figure K-6



Source: U.S. Department of Transportation, 2001

Air Space Diagram (NDB or GPS RWY 8L)

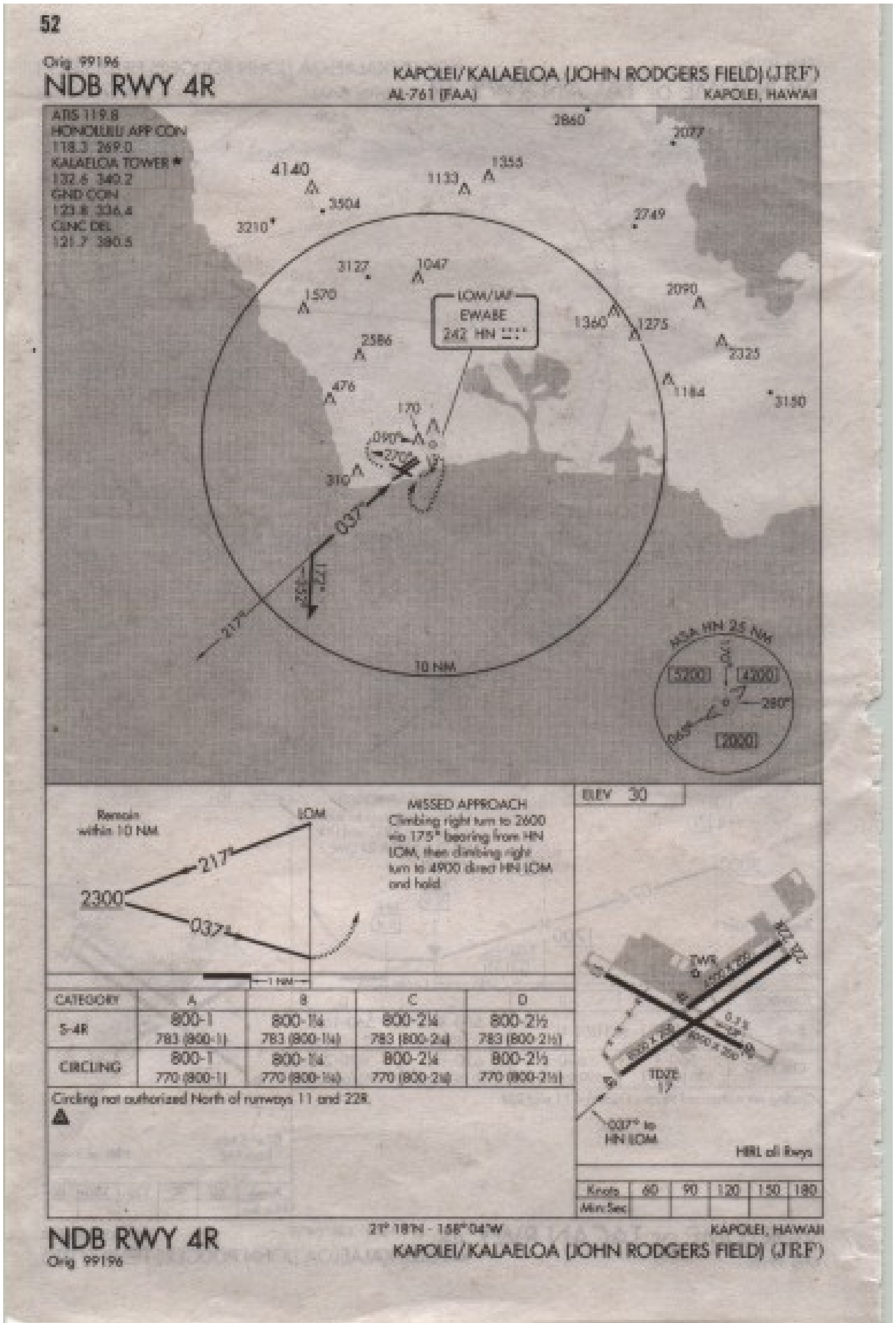
Figure K-7



Source: U.S. Department of Transportation, 2001

Air Space Diagram (VOR/DME or TACAN RWY 4R)

Figure K-8



Source: U.S. Department of Transportation, 2001

Air Space Diagram (NDB RWY 4R)

Figure K-9

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APPENDIX L
DISCUSSION OF AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES AT EWA BEACH AND WAIANAE COAST SITES FROM COORDINATING DRAFT

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DISCUSSION OF AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES AT EWA BEACH AND WAIANAE COAST SITES FROM COORDINATING DRAFT

1.0 Introduction

The Location Assessment (appendix D) described the process by which a slate of five potential shallow-water recovery sites were evaluated in order to support the selection of the highest-rated site as the preferred action (figure D-1). The study compared the physical and environmental attributes of each candidate recovery site in order to support the ranking and decision. Based on the scoring methodology detailed in appendix D, Reef Runway was clearly rated as the preferred site. Of the four other shallow water recovery sites, two (Penguin Bank and Southwest Molokai) were eliminated from further consideration due to their overall poor performance in meeting stated program goals and objectives. The study also concluded that the two remaining sites, Ewa Beach and Waianae Coast, exhibited favorable physical site characteristics and deserved additional study.

Subsequent to the Location Assessment, additional site-specific surveys were performed at Reef Runway, Ewa Beach, and Waianae Coast sites, including detailed fathometric soundings, subsurface video transects, and spot dive observations by marine biologists (appendix J, parts 1 and 2). During the course of these studies, it was determined that Ewa Beach and Waianae Coast were habitat for the threatened green sea turtle, and that shallow water recovery activities would likely affect green sea turtle basking, feeding and resting sites resulting in a harassment “take” under the Endangered Species Act. Further consideration of the Ewa Beach or Waianae Coast sites as alternatives in the Environmental Assessment (EA) would require formal Section 7 consultation. In addition, it was discovered that the Ewa Beach seafloor appeared to steepen rapidly at around 120 feet (36.6 meters), which would challenge basic mission requirements for vessel stability. Both sites would also potentially impact high-use recreational beaches and fishing areas. For these reasons, Ewa Beach and Waianae Coast sites were not carried forward as alternatives in the EA. However, in the event that a Finding of No Significant Impact (FONSI) cannot be reached at the Reef Runway site, and the Navy wishes to pursue additional consultation to achieve a viable site, then Ewa Beach and Waianae Coast could conceivably be reconsidered. For that purpose, the following information on the sites is presented on the affected environment and environmental consequences.

Figure L-1: Potential Shallow water Recovery Site-TO BE SUPPLIED

This appendix is organized in a similar fashion to the EA in that both Ewa Beach and Waianae Coast sites are analyzed for the same critical resources addressed in the EA--that is, water quality, marine biological resources, health and safety, hazardous materials and hazardous waste, and airspace. Each resource area is described in terms of the affected area and the environmental consequence as if each site were being evaluated as an alternative shallow-water recovery site. The discussion herein is limited to Ewa Beach and Waianae Coast sites and does not address potential transit routes or deep relocation site considerations. Figures L-2 and L-3 provide site details for Ewa Beach and Waianae Coast, respectively.

2.0 Water Quality

2.1 Affected Environment

The general composition of the ocean includes water, sodium chloride, dissolved gases, minerals, and nutrients. These characteristics determine and direct the interactions between the seawater and its inhabitants. The most important physical and chemical properties of seawater are temperature, salinity, density, pH, and dissolved gases. Section 3.1 of the EA provides a comprehensive discussion of each of these factors and how they can be altered by plant and animal activities, pollution, and interaction with fresh water.

Complex marine ecosystems occur in Hawaiian waters to depths of 16,500 feet (5,000 meters) and extend inland from the coasts to include coastal marine ponds. Several factors control the variety, distribution, and abundance of marine life, including geographic isolation, subtropical climate, storm waves, and human-caused pollution and development. Water quality at each site, while well mixed, may be degraded by man-made pollutants. Pollutants can generally be characterized as being derived from non-point sources and point sources.

Non-point source pollution is mainly caused by rainfall moving over and through the ground, carrying contaminants. Rainwater, running off roofs, lawns, streets, industrial sites, and pervious and impervious areas, compose surface runoff. As urban runoff travels overland, it can pick up sediment and debris; rubber, oil, grease, and other automobile-related residuals; lawn and garden fertilizers and pesticides; and lead, zinc, asbestos, polychlorinated biphenyls (PCBs), and a host of other pollutants (Belt Collins Hawaii, 1993).

The National Pollutant Discharge Elimination System (NPDES) program is administered by the State of Hawaii's Department of Health, which regulates point sources of pollution. Major point source discharges to Mamala Bay are those from the Sand Island, Honouliuli, and Fort Kamehameha waste-water treatment plants (WWTP) outfalls. Minor point source discharges are those from approximately thirty industrial and agricultural sources. Point source discharges are the sources of conventional pollutants, including biochemical oxygen demand (BOD), total suspended solids (TSS), together with nutrients, indicator bacteria, pathogenic microorganisms, and some metals (Colwell, Orlob, and Schubel, 1996).

Figure L-2: Location of Ewa Beach Site-**TO BE SUPPLIED**

Figure L-3: Location of Waianae Coast Site-TO BE SUPPLIED

Basic water quality standards applicable to potential shallow-water sites in the state of Hawaii are that they shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including the following:

- Materials that will settle to form objectionable sludge or bottom deposits
- Floating debris, oil, grease, scum, or other floating materials
- Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to product objectionable color, turbidity, or other conditions in the receiving waters
- High or low temperatures; biocides; pathogenic organisms; toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water
- Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life
- Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works; highways; subdivisions; recreational, commercial, or industrial developments; or the cultivation and management of agricultural lands (State of Hawaii, 2000)

The following sections describe the affected environment relative to water quality for Ewa Beach and Waianae Coast sites.

2.1.1 Ewa Beach Site

The State of Hawaii classifies the marine waters along Ewa Beach as Class A. It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment can be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with the recreation in and on these waters. These waters shall not act as receiving waters for any discharge that has not received the best degree of treatment or control compatible with the criteria established for this class (State of Hawaii, 2000).

Major sources of marine pollution at the Ewa Beach site include discharge from Pearl Harbor and the Honouliuli wastewater treatment plant outfall. According to the Mamala Bay study, contamination from the Honouliuli wastewater treatment plant can reach beaches in the area of the Ewa Beach shallow-water recovery site (figure L-4). Peak currents of about 12 inches per second (30 centimeters per second) were measured at the Honouliuli waste-water treatment plant outfall located about 2 nautical miles (3.7

kilometers) from the site in approximately 250 feet (75 meters) of water (Colwell, Orlob, and Schubel, 1996).

Figure L-4: Schematic of Mean Circulation Patterns in Mamala Bay-TO BE SUPPLIED

2.1.2 Waianae Coast Site

The State of Hawaii's classification of water in the Waianae Coast site is also Class A. No specific major sources of pollution have been identified. Water quality is assumed to be equal to or higher than Ewa Beach. Water current velocity measurements are not available, but it is judged likely that the near-shore water current velocity is about 10 inches per second (25 centimeters per second), which is typical of Hawaiian waters.

2.2 Environmental Consequences

The only significant quantities of water quality pollutants expected to be on the *Ehime Maru* during shallow-water recovery operations are petroleum products. Records and personal conversations indicate that at the time of the collision, the *Ehime Maru* carried approximately 65,000 gallons (246,000 liters) of diesel fuel, 1,200 gallons (4,500 liters) of lubricating oil, and 46 gallons (182 liters) of kerosene. The ship was also equipped with a carbon dioxide fire extinguishing system, some smaller fire extinguishers of unknown content, and a small hazardous material storage locker. The contents of the locker are unknown, but may have included paints, cleaning solvents, and small quantities of other chemicals.

An attempt would be made to remove any remaining petroleum products at a shallow-water recovery site following crewmember recovery. The potentially affected areas that could result from a catastrophic uncontrolled release of the estimated maximum amount of petroleum products on board the ship were modeled (appendix H). These simulations indicate with a 90 percent confidence level where the maximum surface area of a fuel/oil release would be expected within progressive time intervals following a release. The actual area would depend on a number of factors including the amount and type of product released (diesel fuel spreads faster, but is more volatile than lubricating oil), the wind direction and strength, tidal cycle, wave height, and ocean temperature and currents at the time of release. However, because of the potential for a release, the U.S. Navy would take all reasonable precautions to ensure that proposed activities are conducted during favorable sea and wind conditions and would be prepared to contain and remove petroleum on the seawater surface.

Therefore, the environmental effect of a petroleum release during proposed activities at both the Ewa Beach and Waianae Coast sites would be minimal. Additionally, removal of any petroleum currently remaining on board the ship would have a long-term beneficial effect on marine water quality.

Some increase in water turbidity may occur during the placing of the *Ehime Maru* on the ocean bottom in shallow water and due to anchoring of the dive support barge and other support ships. Seafloor sediments at either Ewa Beach or Waianae Coast sites are primarily sand-sized particles and rubble, which would quickly settle to the bottom. Thus, any exceedance of the state water quality criteria for turbidity of Class A marine water would be localized and very short-term; therefore, no adverse impacts to the Class A water quality for turbidity would occur.

2.2.1 Ewa Beach

The Ewa Beach site is located down the prevailing current direction from the mouth of Pearl Harbor and the outfalls of the Honouliuli and Pearl Harbor waste-water treatment plants. This site is expected to have degraded water quality because of existing pollution. Because of the procedures that would be in place to respond to a release, any further reduction of water quality during proposed activities is expected to be minimal and short term.

2.2.3 Waianae Coast

The Waianae Coast site is located down-current from the sources of pollution addressed above, but also is quite distant from these sources. Therefore, this site is expected to have the smallest amount of marine pollution of the two sites. Because of the procedures that would be in place to respond to a release, any further reduction of water quality during proposed activities is expected to be minimal and short-term.

3.0 Marine Biological Resources

3.1 Affected Environment

Complex marine ecosystems occur in Hawaiian waters to depths of 16,500 feet (5,000 meters) and extend inland from the coasts to include coastal marine ponds. Several factors control the variety, distribution, and abundance of marine life, including geographic isolation, subtropical climate, storm waves, and human-caused pollution and development.

All of the activities necessary to implement a recovery operation would be conducted under water. Therefore, the emphasis in this section is on marine ecosystem and biota, including seabirds. Terrestrial biological resources are not addressed since those areas where elements of a Proposed Action would take place onshore are already developed and disturbed. The existing marine biological environment addresses four principal attributes: (1) marine fish and essential fish habitat (EFH), (2) marine mammals, (3); migratory birds associated with the marine environment; and, (4) threatened and endangered species. Shorebirds are also addressed. Section 3.2 of the EA provides a comprehensive discussion of biological diversity to add context to this discussion, as well as including extensive background information on marine fish; essential fish habitat and coral; marine mammals; migratory birds; and threatened and endangered species (including Humpback Whale, Hawaiian Monk Seal, Sperm Whale, Green Sea Turtle, and Hawskbill Sea Turtle).

3.1.1 Ewa Beach

Marine Fish, Essential Fish Habitat, and Coral

A submerged reef extends seaward from the Ewa coast and is widest where it fronts Ewa Beach. Depth increases very gradually offshore with the reef edge located about 4,500 feet (1,500 meters) offshore. Limestone rubble and sand litter the reef terraces present offshore at depths greater than 50 feet (17 meters). Vertical relief is greatest at water depths of 60 to 75 feet (18 to 23 meters) where live corals are abundant. Below about 80 feet (24 meters) the substrate is characterized by a mix of ancient reef limestone, coral rubble, sand, and occasional live coral outcrops. Sand deposits are sometimes deep, and vertical relief is provided by cone-shaped mounds resulting from the activities of burrowing organisms (appendix J, part 1).

An April 22, 2001 survey revealed that corals range from locally abundant on the inshore reaches of the Ewa Beach site where substantial reef development exists, to uncommon on the broad sandy slopes on the seaward side of the site (figure L-5). Coral coverage ranges from 80 to 90 percent in inshore patch reefs to less than 1 percent in offshore areas. The coral community is dominated by cauliflower coral, lobe coral, and finger coral. In some areas, substrate depressions are littered with coral rubble dominated by broken finger coral. The absence of significant coral erosion and epiphytic algal growth on finger coral is suggestive of recent storm wave damage, perhaps associated with regional hurricane disturbances (e.g., Hurricane Iwa) (appendix J, part 1).

A diverse and abundant fish fauna is associated with areas of high coral coverage and vertical relief. During the April 22, 2001 survey, the most common families represented were surgeonfishes (acanthurids), butterflyfishes (chaetodontids), damselfishes (pomacentrids), wrasses (labrids), triggerfishes (balistids) and the zanclid, (Moorish idols). Common invertebrates associated with the study area included sea cucumbers (holothurians), rock boring and black urchins (echinoids), and sea stars (asteroids). Earlier studies identified 59 species of fishes off Ewa Beach, of which 20 were regarded as abundant (U.S. Army Corps of Engineers, 1979).

The Ewa Beach site is within the bottomfish management unit species EFH for eggs, larvae, juveniles, and adult bottomfish. Given the water depths at the Ewa Beach site, the escarpment and slope habitats areas of particular concern would not be within the region of influence (ROI) for the Ewa Beach site. It is also not in the EFH for pelagic management unit species.

Precious coral beds occur in deep inter-island channels and off promontories at depths between 300 and 1,500 meters. Deep-water precious corals include black, pink, gold and bamboo coral. The precious coral beds make up the precious coral management unit species. No known major precious coral bed locations are located in the ROI for the Ewa Beach shallow-water recovery site.

The Ewa Beach site is within the EFH for larvae, juvenile, and adult spiny lobster. However, it is not in the more sensitive designated habitat areas of particular concern for juvenile spiny lobster.

Marine Mammals

The probability of protected spotted dolphins, spinner dolphins, and bottlenosed dolphins being present in the ROI for the Ewa Beach site is high. Ongoing studies of Hawaiian Spinner dolphins show a high probability of encountering this species at the Ewa Beach shallow-water recovery site (Lammers, unpublished data). Spotted dolphins and bottlenosed dolphins may also occur in the area.

Figure L-5: Corals at Ewa Beach Site-TO BE SUPPLIED

Migratory Birds

As noted in section 3.2 of the EA, thirty-nine species of migratory seabirds are known to occur in the Hawaiian Island chain. Twenty-two of these species breed in Hawaii. The Ewa Beach site is within the potential foraging range of many of the seabird species. The foraging range of some of these species is estimated to be between 98 and 300 miles (159 and 480 kilometers). However, it is unlikely that the number of foraging seabirds exceeds about 1.5 seabirds per square mile (0.6 birds per square kilometer) in the ROI at the Ewa Beach site. Some of the seabird species that might be expected in the Ewa Beach site ROI include the red-footed booby, brown booby, masked booby, white-tailed tropic bird, red-tailed tropic bird, sooty tern, brown noddy, and the wedge-tailed shearwater, among others (table 3-3). However, the southern coast of Oahu appears to have less foraging activity by sea birds than other areas of the island.

Common shorebirds in the area of the ROI for the Ewa Beach site include the Pacific golden plover, ruddy turnstone, sanderling, and wandering tattler.

Threatened and Endangered Species

The threatened green sea turtle is common in the Ewa Beach site. The abundance of living coral provides protected ledges where turtles rest. Seagrass and algae provide considerable foraging opportunity for this species. The endangered hawksbill turtle is an uncommon visitor and occasional breeder in Hawaiian waters, but would not be expected in the Ewa Beach site ROI.

The likelihood of any of the endangered or threatened marine mammals being present within the Ewa Beach site is quite low. The humpback whales will have left the area in June on their annual northward migration. Sperm whales almost never occur in shallow waters. Hawaiian monk seals, while seen in the general area once in 1978, are extremely rare in that area.

Two seabird species that occur in the Hawaiian Islands and may occur in the Ewa Beach site ROI are on the U.S. Fish and Wildlife Service list of threatened and endangered wildlife. One species that could forage in the ROI is the Hawaiian petrel, an endangered species. One other species, the Newell's shearwater, is listed as threatened and could also forage in the Ewa Beach site ROI. Both of these listed species breed in Hawaii.

3.1.2 Waianae Coast

Marine Fish, Essential Fish Habitat, and Coral

The Waianae Coast site is situated north of Barbers Point Harbor and offshore of the Koolina Resort, on the leeward side of the Waianae Mountains. The natural shoreline was modified during construction of Koolina Resort to create four protected swimming lagoons.

The Waianae Coast site is dominated by unconsolidated sand that occurs along the largely flat to sometimes undulating reef slope. Water depths range from approximately 40 feet (12 meters) at the east (landward) side of the ROI to 92 feet (28 meters) on the west (seaward) side. With the exception of a well-developed coral reef on the landward side of the study area the substrate is dominated by unconsolidated sand with occasional patches of limestone rubble. Vertical relief in areas of coral development is about 3 to 5 feet (1 to 1.5 meters); elsewhere it is limited to just a few inches (centimeters) of current-rippled sand (appendix J, part 1).

An April 24, 2001 survey identified inshore areas at depths between 50 and 70 feet (15 and 21 meters) with a modestly diverse coral community (figure L-6). This coral community had a coverage in localized areas ranging from an estimated 40 to 50 percent. Cauliflower coral was the dominant coral, followed by lobe coral, finger coral, and rarely, *P. verrucosa.* Upright flattened branches on several colonies were suggestive of the antler coral *Pocillopora eydouxi*. Coral coverage declines significantly offshore where expansive sand flats harbor only an occasional colony of cauliflower coral on an otherwise featureless sand bottom. Coral coverage decreases moving seaward across the study area (appendix J, part 1).

At the time of the April 24 survey, fish were rare across the broad, featureless sandy bottom, except where an occasional colony of cauliflower coral provides habitat. The Hawaiian dascyllus was often abundant in such areas. Small schools of pennant fish (*Heniochus diphreutes)* were present in two areas. Two Hawaiian cleaner wrasses (*Labroides phthirophagus)* were present at a depth of 90 feet (27 meters) on a cleaning station dominated by a steel cable. Moorish idols and several unidentified damselfishes (pomacentrids) were present in the same area as the wrasses. Surgeonfishes (acanthurids), triggerfishes (balistids), wrasses, (labrids), and butterflyfishes (chaetodontids) comprised the remaining fish fauna (appendix J, part 1).

Past surveys conducted in the vicinity of Barbers Point Harbor have identified 57 species of fish from large boulders and a drop-off at a depth of 45 feet (15 meters). The most abundant species were the smalltail wrass (*Pseudojuloides cerasinus),* fantail filefish *(Pervagor spilosoma),* and the blackfin chromis (U.S. Army Corps of Engineers, 1979).

Common invertebrates present included black sea urchins and unidentified sea cucumbers. Both species were associated with coral rubble patches. An unidentified filamentous upright algae with delicate intertwined wispy filaments is common over wide areas of sandy substrate at the Waianae Coast site (appendix J, part 1).

The Waianae Coast site is within the bottomfish management unit species EFH area for eggs, larvae, juveniles, and adult bottomfish.

Given the water depths at the Waianae Coast site, the escarpment and slope habitat areas of particular concern would not be within the Waianae Coast site ROI. The Waianae Coast site would be in the EFH for pelagic management unit species. No known major precious coral beds are located in the Waianae Coast site ROI.

Figure L-6: Corals at the Waianae Coast Site-TO BE SUPPLIED

The Waianae Coast site is, however, within the EFH area for larvae, juvenile, and adult spiny lobster. It is not, however, in the more sensitive designated habitat areas of particular concern for juvenile spiny lobster.

Marine Mammals

The probability of protected spotted dolphins, spinner dolphins and bottlenosed dolphins being present in the Ewa Beach site ROI is high. Ongoing studies of Hawaiian Spinner dolphins show a high probability of encountering this species at the Waianae Coast site (Lammers, unpublished data). Spotted dolphins and bottlenosed dolphins may also occur in the area.

Migratory Birds

Thirty-nine species of migratory seabirds are known to occur in the Hawaiian Island chain. Twenty-two of these species breed in Hawaii. The Waianae Coast site is within the potential foraging range of many of the seabird species. The foraging range of some of these species is estimated to be between 98 and 300 miles (159 and 480 kilometers). However, it is unlikely that the number of foraging seabirds exceeds about four seabirds per square mile (1.6 birds per square kilometer) in the ROI for the Waianae Coast site. Some of the seabird species that might be expected in the ROI include the red-footed booby, brown booby, masked booby, white-tailed tropic bird, red-tailed tropic bird, sooty tern, brown noddy, and the wedge-tailed shearwater, among others. The red-footed and brown boobies are potentially the most common of the seabirds foraging in the ROI.

Common shorebirds in the area of the Waianae site ROI include the Pacific golden plover, ruddy turnstone, sanderling, and the wandering tattler.

Threatened and Endangered Species

The threatened green sea turtle is present in the coral reef areas of the Waianae Coast site, which is expected since they are common from Barbers Point to Waikiki. The likelihood of any of the endangered or threatened marine mammals being present within this site is quite low. The humpback whales will have left the area in June on their annual northward migration. Sperm whales almost never occur in shallow waters. Hawaiian monk seals, while seen in the general area once in 1978, are extremely rare in the area. The endangered hawksbill turtle is an uncommon visitor and occasional breeder in Hawaiian waters, but would not be expected in the Waianae ROI.

Two seabird species that occur in the Hawaiian Islands and may occur in the area of the Waianae Coast site ROI are on the U.S. Fish and Wildlife Service list of threatened and endangered wildlife. One species that could forage in the ROI is the Hawaiian petrel, an endangered species. One other species, the Newell's shearwater, is listed as threatened and could also forage in the ROI. Both of these listed species breed in Hawaii.

3.2 Environmental Consequences

Biological resources potentially affected by a recovery action are evaluated using an approach based on consideration of habitat quality, duration of the impact, quantity of habitat impacted and susceptibility of the resource to damage. For the recovery operations, the Navy would take every precaution to minimize impacts to marine biological resources. These steps would include notifying the appropriate resource agencies through the Operational Orders and the Incident Action Plan (IAP) to administer necessary assistance if marine mammals or migratory birds should come in contact with an unplanned fuel/oil release.

3.2.1 Ewa Beach

Marine Fish, Essential Fish Habitat, and Coral

Disturbance to benthic biota at the Reef Runway shallow-water recovery site could result from the following actions: (1) deployment and positioning sandbags or other devices on the seafloor (for vessel stabilization); (2) vessel alignment and placement at the recovery site; (3) anchoring and mooring of the recovery vessels; (4) movement of ROVs and ROV umbilical cables; (5) diver activities; (6) dropping *Rockwater 2* or recovery barge equipment or tools onto the reef slope; and (7) an unplanned fuel/oil release.

<u>Deploying and positioning sandbags or other support apparatus on the reef slope (for vessel stabilization).</u> As described in chapter 3 of the EA, the Ewa Beach site is dominated by sand, large swaths of finger coral rubble, and abundant coral development on the inshore (north) side of the of the recovery site. The site is also an important resting and possibly foraging area for the green sea turtle. Deployment and positioning of sandbags or other support apparatus could be handled in a manner to avoid or minimize disturbance to benthic communities. However, elements of implementing the Proposed Action at the Ewa Beach site could potentially disturb green sea turtle feeding and resting habitats and behavior.

<u>Alignment and positioning of the vessel at the recovery site.</u> As with the Reef Runway shallow-water recovery site, alignment and positioning of the *Ehime Maru* at the Ewa Beach site could damage or destroy live corals and other bottom dwelling organisms. The lift ship and diving barge positioning capabilities and the availability of detailed habitat and bathymetric maps would minimize the chance for significant damage to benthic communities. However, engine noise and vibration from the recovery barge could disturb green sea turtles.

Anchoring and mooring of the recovery vessels. The Ewa Beach site is a biologically diverse area. Because the seafloor in the Ewa Beach site is less disturbed and more pristine than the Reef Runway shallow-water recovery site, the placement and positioning of the recovery barge's anchors, mooring chains, and cables and their post-recovery retrieval would have a greater potential to impact coral and other benthic communities. The potential for reef damage is greater at the Ewa Beach site than at the Reef Runway shallow-water recovery site. Because of the greater density of coral on the northern side of the survey area, mooring impacts could be greater than in more offshore areas where coral density and diversity is lower. Engine noise and vibration associated with mooring operations could also cause green sea turtles to flee the area of disturbance, potentially forcing them into other areas where food may be limited and bottom resting areas not providing the same degree of protection as the Ewa Beach site.

4. Movement of ROVs and ROV umbilical cables. The movement of ROV and ROV umbilical cables has the potential to cause minor damage to benthic communities. However, because of the greater abundance and coverage of live coral at the Ewa Beach site, impacts would be expected to have a greater magnitude.

5. Diver activities. The impact of diver activities at the Ewa Beach would largely entail minor disturbance or damage to corals, and benthic organisms and fish associated coral rubble and sand communities. It is unlikely that diver activities alone would contribute to any significant disruption of green sea turtle foraging, basking, and resting sites. However, turtles may leave the area of disturbance for the duration of the recovery efforts, which could change established feeding, basking, and resting habits and behavior.

6. Dropping of equipment and tools from the dive support barge. The accidental dropping of equipment or tools from the recovery barge or other surface support vessels could result in minor damage, particularly to live corals. However, the impact of such an event would be minimal.

7. Release of fuel/oil. There would be a potential for a fuel/oil release at the Ewa Beach site in a recovery operation. The impact of such an event on benthic biota is similar to those described for the Reef Runway shallow-water recovery area. However, the abundance of green sea turtles at the Ewa Beach site increases the potential that basking turtles may be adversely affected by fuel/oil. Containment booms and skimmers would be located onsite. If fuel/oil were to escape from initial containment areas and could potentially affect the marine environment, the booms and skimmers would be positioned to contain and recover the release of fuel/oil. The prevailing northeasterly trade winds and prevailing currents would carry any such surface release or "sheen" in a southwesterly direction where it would volatilize or be skimmed from the surface of the ocean in accordance with the recovery plan. In the event of a Kona Wind (winds from the south) or other unforeseen weather condition, or a change in currents, the booms and skimmers would be repositioned to contain and recover fuel/oil that may have escaped initial containment

The Ewa Beach site is within the EFH for bottomfish management unit species. The Council has designated the water column and all bottom habitat from the shoreline to a depth of 1,312 feet (400 meters) as EFH for bottomfish. The Council also designated all escarpments and slopes between 131 and 919 feet (40 to 280 meters) as a habitat areas of particular concern. There are no habitat areas of particular concern for bottomfish associated with the Ewa Beach shallow-water recovery site because water depths of 120 feet (37 meters) occur at the extreme south (seaward) side of the study area and are at a depth below operational diving requirements. The Proposed Action at the Ewa Beach shallow-water recovery site is not expected to have an impact on the EFH for any developmental stage of the bottomfish management unit species.

As with the Reef Runway shallow-water recovery site, there would be no adverse impacts from recovery activities or a fuel/oil release to the EFH for the crustacean management unit, or on habitat area of particular concern for juvenile spiny lobster. In addition, there would be no impact on EFH within the pelagic management unit.

Marine Mammals

The potential for impacts to marine mammals due to an unplanned release of fuel/oil during the raising of the *Ehime Maru* is remote. It is unlikely that Hawaiian monk seals would be present in the channel area where the vessel rests. There is evidence that dolphins can identify the presence of fuel/oil and avoid it (St. Aubins, et al., 1985); it is likely that the migratory humpback whale would have left for its northern feeding grounds. The sperm whale would not be expected in the relatively shallow water off Penguin Bank (2000 feet [600 meters]) when it apparently prefers deeper waters (6,000 feet [1,800 meters]).

Migratory Sea Birds

Potential impacts to migratory sea birds would be expected to be minimal. Since the numbers of sea birds expected to be foraging in the area is low, 1.5 birds per square mile (0.6 birds per square kilometer), it is unlikely that significant numbers of birds would be adversely affected by fuel/oil. Overall potential impacts from the Proposed Action to migratory seabirds would be expected to be minimal.

Threatened and Endangered Species

The threatened green sea turtle is abundant in the nearshore waters in the area of the Ewa Beach site. The recovery activities are likely to affect the green sea turtle basking, feeding and resting sites, and possibly their behavior at the Ewa Beach site. This would result in a harassment "take" under the Endangered Species Act. Even with the implementation of the fuel/oil release response component of the IAP it is possible that one or more green sea turtles would be oiled. This would also constitute a take under the Endangered Species Act. However, these takes would not jeopardize the continued existence of the species.

The endangered humpback whale would have migrated north from Hawaiian waters by the time the lifting of the *Ehime Maru* at the current location occurs. There would be no effect on the humpback whale. The endangered sperm whale generally occurs further offshore and in deeper water than the current location. Consequently, there would be no anticipated effect on the sperm whale. The Hawaiian monk seal may only occur in the area of the Proposed Action on a transient basis, if moving from one island to another. The potential that a Hawaiian monk seal would be in the area on the day the vessel would be lifted is very low, and it is expected that there would be no effect on the species.

The potential that the endangered Hawaiian black-rumped petrel and the threatened Newell's shearwater would occur in the area of the current location is remote. If the overall potential for seabird foraging in the area is less than 1.5 birds per square mile (0.6 birds per square kilometer), then the potential for the two listed species to forage over the site is very low. It is expected that there would be no effect on the Hawaiian black-rumped petrel or the Newell's shearwater.

3.2.2 Waianae Coast

Marine Fish, Essential Fish Habitat, and Coral

Disturbances to benthic biota at the Waianae Coast site could result from proposed recovery operations. Overall impacts to the bottom dwelling species are expected to be less at the Waianae Coast site because of the overwhelming importance of unconsolidated sands that dominate the identified recovery location.

1. Deployment and positioning of sandbags or other support apparatus on the reef slope (for vessel stabilization). The deployment and positioning of sandbags or other support apparatus on the seaward reef slope is not expected to involve any discernible impact to benthic communities since the affected area is composed of deep unconsolidated sand with patches of coral rubble. The impact of sandbag deployment and positioning on benthic biota at the Waianae Coast site would be low to non-existent because of the extent of the unconsolidated sandy reef slope.

2. Vessel alignment and placement at the recovery site. The alignment and placement of the *Ehime Maru* at the Waianae Coast site could result in minor disturbances to bottom dwelling organisms. However, the overall density of any such organisms is very low because of the nature of the unconsolidated sand substrate that dominates the study area. Damage to the coral and associated benthic and reef fish community on the submarine slope and terrace is unlikely because of the positioning capabilities of the recovery lift ship and diving barge and the availability of precise habitat and bathymetric maps that have been prepared to understand the distribution and density of sensitive resources. Alignment and placement of the *Ehime Maru* could produce noise and vibrations that could disturb resting green sea turtles transiting the area and those occupying caves and tunnels along the base of the reef terrace. Basking green sea turtles may also experience disturbance resulting from engine noise and vibrations.

3. Anchoring and mooring of the recovery vessels. The placement and positioning of the recovery barge's anchors and mooring chains and cables and their post-operational retrieval have the potential to inflict minor damage upon benthic communities, though bottom impacts are expected to be largely limited to minor changes in the submarine topography

on the sandy reef slope. However, engine noise and vibrations may disturb resting, basking, and/or feeding green sea turtles in the general area of mooring activities.

4. Movement of ROVs, and ROV umbilical cables. As was described for the Reef Runway and Ewa Beach shallow-water recovery sites, ROV-associated actions would likely disturb sand deposits, but impacts on bottom dwelling organisms would not be expected because of the impoverished nature of the unconsolidated sand substrate that dominates the Proposed Action area. ROV activities could also result in disturbances to green sea turtles. However, any such effects are expected to be inconsequential.

5. Diver activities. Diver activities may result in minor impacts on benthic species and slight alterations of bottom topography, but any such effects would not be adverse. Diver activities may also result in disturbances to green sea turtles.

6. Dropping of equipment and tools from the dive support barge. The accidental dropping of equipment or tools from the recovery barge into the water is not expected to produce any environmental effects because of the absence of any benthic fauna associated with the prevailing unconsolidated sand slope that dominates the study area.

7. Release of fuel/oil. During crewmember recovery and cleanup operations, there is the potential for a fuel/oil release. Although containment booms and skimmers would be located onsite, some material may escape from the containment area and could potentially affect the marine environment. A fuel/oil release could result in the fouling of basking green sea turtles.

The Waianae Coast site is within the EFH for bottomfish management unit species. The Council has designated the water column and all bottom habitat from the shoreline to a depth of 1,200 feet (400 meters) as EFH for bottomfish. The Council also designated all escarpments and slopes between 120 and 840 feet (40 to 280 meters) as a habitat area of particular concern. There is no habitat area of particular concern for bottomfish associated with the Waianae Coast site because water depths of 120 feet (40 meters) do not occur within the relocation area. Given the lift ship and diving barge precise positioning capabilities, and the availability of habitat and bathymetric maps, project actions are not expected to disturb the EFH for any developmental stage of the bottomfish management unit species.

As with the Ewa Beach site, there would be no impacts to the EFH for the spiny lobster, or on any habitat areas of particular concern for juvenile spiny lobster. In addition, there would be no impact on EFH for pelagic management unit species at the Waianae Coast site.

Marine Mammals

The potential impacts on marine mammals at the Waianae Coast site due to recovery operations is the same as for the Ewa Beach site.

Migratory Sea Birds

Potential impacts to migratory sea birds would be similar to that described for the Ewa Beach site. With implementation of the fuel/oil release response component of the Proposed Action there should be no impacts on the common shorebirds that frequent the area of the Waianae Coast site.

Threatened and Endangered Species

Potential impacts to threatened and endangered species at the Waianae Coast site would be similar to the Ewa Beach site. The threatened green sea turtle is abundant in the nearshore waters in the area of the Waianae Coast site. The recovery activities would likely affect green sea turtle basking, feeding and resting sites, and possibly their behavior. This would result in a harassment "take" under the Endangered Species Act. Even with the implementation of the fuel/oil release response component of the Proposed Action, it is possible that one or more green sea turtles would be oiled. This would also constitute a take under the Endangered Species Act. However, these takes would not jeopardize the continued existence of the species.

4.0 Health and Safety

Health and safety issues associated with underwater recovery operations include worksite and diver safety, diving and boating mishaps, weather, control of public access, damage to public recreation areas, and oil spill risks.

4.1 Affected Environment

Health and Safety Environment

The Clean Islands Council maintains a Site Safety and Health Plan that focuses on the protection of personnel from serious risks to their physical safety and health while responding to a marine discharge. The Hawaiian Area Contingency Plan identifies health and appropriate personnel protective equipment requirements essential for worker safety. The Plan also identifies site control and security requirements, along with site characterization and monitoring requirements. There are standard procedures for reporting medical and fire emergencies, including a medical plan that identifies nearby hospitals and clinics.

Hospitals capable of responding to health and safety issues include Queens Medical Center and Kuakini Hospital in downtown Honolulu, and Airport Urgent Care at Honolulu International Airport. A Safety Officer, field operators, and group supervisors are identified in the Site Safety and Health Plan. For divers, close-by decompression chambers are at Pearl Harbor.

The operational phase of an oil spill response is often characterized by changing conditions at and near the spill site. Accordingly, these oil spill responders are trained to recognize and monitor hazard conditions and implement standard operating procedures and response strategies to protect themselves while effectively responding to the emergency.

Hazardous weather conditions could pose a safety hazard. The National Weather Service and the Navy Meteorological Office at Pearl Harbor are the primary sources for obtaining weather information. Adverse weather conditions include high wind and sea conditions, tsunamis, and hurricanes. It is the commander's responsibility to evaluate if the weather conditions are potentially hazardous, based on available information, experience, and the operational limits of the recovery vessels.

Public Safety

This section provides an overview of the existing activities that could affect public health and safety. Additionally, those public recreational areas at risk from a mishap in the ROI are identified.

There are a large variety of ocean and coastal activities in the nearshore and offshore waters of the Hawaiian Islands. These activities include recreational and commercial fishing, swimming, board and body surfing, scuba diving, shell collecting, and aquarium fish collecting. There are a large number of public recreation areas and natural resource management areas (state parks, wildlife reserves, etc.) along Hawaii's coastal areas. These areas draw visitors from all over the world and are a driving force behind the State's economy. In addition, the nearshore and coastal waters are highly productive areas for the commercial fishing industry. Thus, Hawaiian waters and shorelines have an unusually high level of environmental and economic sensitivity. Generally, nearshore and offshore areas are open to commercial and recreational users at all times and are not restricted. Presently, the only nearshore and offshore waters on Oahu that are off-limits to public access are those areas surrounding Department of Defense facilities (e.g., Pearl Harbor and Kaneohe Bay). Special activities that might result in the temporary restriction of access into otherwise open waters are promulgated through a weekly Notice to Mariners (NOTMAR).

Existing public health and safety risks in the ROI are associated with recreational activities, commercial boating, and potential hazardous materials release from shipping and industrial activities. Hazardous materials releases are managed in accordance with appropriate federal, state, and local regulations.

The existing shoreline at the shallow-water recovery site has existing sewage outfalls and petroleum product off-loading facilities at designated anchorage areas. All of these facilities pose some existing potential for hazard to public safety.

Diver Safety

The U.S. Navy conducts diving activities in accordance with *The U.S. Navy Diving Manual*. This manual provides the latest procedures and equipment for conducting safe diving activities. *The U.S. Navy Diving Manual* identifies the required equipment and procedures for using surface-supplied diving equipment as well as the requirements for emergency gas supply equipment that is used for enclosed space diving. (U.S. Navy, 1999).

4.1.1 Ewa Beach

The Ewa Beach site is outside the Pearl Harbor Defensive Sea Area. There are no restrictions to commercial or recreation activities in the Ewa Beach site ROI. Ocean activities occurring at site include such activities as netting, fishing, tropical fish collecting, surfing, scuba diving, paddling, kayaking, and shelling. Ewa Beach Park, located about 1.6 nautical miles (3 kilometers) to the northeast, is a typical public beach park with some offshore fishing and diving. Oneula Beach Park is 2.1 nautical miles (2 kilometers) due north and has similar activities (U.S. Department of the Interior, 1998b). A commercial net pen cage aquaculture site is located in close proximity to the Ewa Beach site. There are petroleum product off-loading and pipeline facilities to the west of the Ewa Beach site in the Barbers Point area.

4.1.2 Waianae Coast

The Waianae Coast site is northwest of Barbers Point Harbor. There are no restrictions to commercial or recreation activities in this area. Ocean activities occurring in the site ROI include such activities as net fishing, pole and line fishing, tropical fish collecting, surfing, scuba diving, paddling, kayaking, and shelling. The Waianae Coast area has a number of coastal near-shore activities. Ko Olina Beach Park is 0.8 nautical mile (1.6 kilometers) southeast; Makiawa Beach Park is 1.1 nautical miles (2 kilometers) north-northeast; and Kahe Point Beach Park, a well known snorkeling area, is 1.4 nautical miles (2.5 kilometers) north (U.S. Department of the Interior, 1999). There are petroleum product off-loading and pipeline facilities to the south of the Waianae Coast site in the area of Barbers Point.

4.2 Environmental Consequences

Potential health and safety issues at Ewa Beach and Waianae Coast sites would be associated with nearby public recreational activities and recovery diver safety. These potential safety issues would be the same for all potential shallow-water sites and are addressed below. Specific issues related to each site follow this discussion. Health and safety issues related to an unplanned fuel/oil release is addressed in section 4.4 of the EA (Hazardous Materials and Hazardous Waste). As analyzed in that section, the Navy would be prepared with the appropriate plans and equipment for a maximum credible release; thus, there should be minimal increased safety risk to public health and safety.

Public Safety

The diving operation could generate intense interest and curiosity from the public. The ability to establish and control public access would be essential to protect the safety of both the general public and divers. To ensure the protection of all persons and property, a 1-nautical-mile (1.85-kilometer) over-water safety perimeter around the recovery operations would be established and implemented for operations in these areas. Therefore, there would be minimal risk to the public during these activities.

Diver Safety

Diver safety would be of paramount importance, and all safety measures would be followed during recovery operations. The Navy would establish a controlled zone around the recovery operations to ensure diver safety. Voice communication integrity for the diving recovery operations would be maintained by establishing a minimum flight ceiling over the area and for a radius of 1,000 feet (300 meters). Establishment of this ceiling would be accomplished through temporary flight restrictions issued by the FAA and enforced by Honolulu International Airport authorities. A more detailed discussion of airspace and related issues is provided in section 4.5 of the EA (Airspace).

During the recovery effort, there would be a potential for an increased risk to diver safety. To ensure diver safety, all operations are conducted in accordance with *The U.S. Navy Diving Manual*. This manual, which is based on the Navy's long history of conducting diving operations, provides the latest procedures and equipment for conducting safe diving activities. *The U.S. Navy Diving Manual* identifies the required equipment and procedures for using surface-supplied diving equipment as well as the requirements for emergency gas supply equipment that is used for enclosed space diving. Operating procedures and emergency procedures would be in place to support operation of the system and recovery from emergency situations. In addition, a Diving Medical Officer would be onboard the diving support vessel at all times and would be accompanied by diving medical technicians. Standby divers would be available at all times to render emergency assistance. To ensure appropriate communication between divers, the dive teams would practice together for at least a week before the recovery operations. Given the in-place procedures and equipment, there would no increased risk to diver safety compared to other diving operations. The Recovery Officer would establish appropriate diver safety requirements for all aspects of environmental response operations. Further, divers would not undertake any action that might result in an immediate release of oils or hazardous substances into the shallow-water marine environment (NAVSEA, 2001b).

In summary, the Navy has a long history of providing for diver safety and has extensive experience in conducting diving operations similar to those associated with this recovery effort. Every effort would be taken during recovery operations to minimize the risk to diver health and safety; therefore, no impacts would be expected.

4.2.1 Ewa Beach

The Ewa Beach site is west of the Reef Runway shallow-water recovery site and is outside the Pearl Harbor Defensive Sea Area. There are no restrictions to commercial or recreational activities in this area. To minimize the risk to the public and the recovery operation, the Navy would establish a 1-nautical-mile (1.85-kilometer) over-water safety perimeter around the recovery operations in this area. This area is not within line-of-site monitoring from the Pearl Harbor tower of the Defensive Sea Area; therefore, Navy-owned security boats would be on patrol 24 hours a day, 7 days a week, to prohibit small boats from intruding upon the operation. Special activities such as these that might result in the temporary restriction of access into otherwise open waters would be promulgated through a weekly NOTMAR. Overall, there would be minimal risk to the public or recovery divers from operations at this shallow-water site.

As with the Reef Runway shallow-water recovery site, the Fleet Recompression Chamber would be less than 15 minutes away by boat.

4.2.2 Waianae Coast

This Waianae Coast site is northwest of Barbers Point Harbor and is also outside the Pearl Harbor Defensive Sea Area. The potential health and safety issues and over-water safety perimeter would be similar to those described for the Ewa Beach site.

In the event of a life-threatening emergency, this site would be farther away from the Fleet Recompression Chamber at Pearl Harbor than the Ewa Beach site. An emergency medical evacuation would require transfer to shore by boat and then a helicopter flight; however, this evacuation could be achieved in less than 30 minutes. Because of the additional time response at this site, there would be an increased risk to diver safety.

5.0 Hazardous Materials and Hazardous Waste

5.1 Affected Environment

The affected environment for hazardous materials and hazardous waste includes the sensitive resource areas that could potentially be affected by an unplanned release of oil, and any existing hazardous waste areas that may occur in the ROI.

The Emergency Ship Salvage Material (ESSM) system at Pearl Harbor, Hawaii, is part of a worldwide network of warehouses that stores and maintains a significant stockpile of oil pollution abatement equipment. The ESSM system pollution abatement equipment includes open ocean boom and skimming systems, specialized inland response systems, floating storage and offload systems.

All equipment is available for immediate deployment and is available to all federal agencies. Equipment is capable of containment and recovery of many grades of refined and crude oils, including heavy residual oils, and marine and jet fuels. The ESSM system includes a range of equipment as listed in table L-1.

Table L-1: ESSM System Equipment

Spilled Oil Recovery	Casualty Off-Loading	Ancillary Support Equipment
Containment booms	Oil transfer pumps and hoses	Personnel support vans
Open-ocean skimmers	Floating hose systems	Maintenance vans
Small skimmers	Hot tap systems	Support vessels
In-situ burning equipment	Portable generators	Cleaning equipment
Sorbent materials	Portable firefighting pumps	Command vans
Vacuum recovery systems	Hydraulic power packs	Communications systems
Floating storage bladders	Salvage equipment	Small boats all-terrain vehicles material handling equipment

The Clean Islands Council is a consortium of regular and associated members working together with the entire Hawaii community to foster, train, and demonstrate safe work practices related to responding to an oil spill. The Hawaii Area Committee is a spill preparedness and planning body made up of industry, federal, state, and local agency representatives including the Clean Islands Council. The Federal On-Scene Coordinator coordinates the activities of the Area Committee and assists in the development of a comprehensive Area Contingency Plan that is consistent with the National Contingency Plan.

The Hawaii Area Contingency Plan provides guidance in the preparation of a proper Site Safety and Health Plan for all IAPs related to oil spills. During a spill event the Clean Islands Council Spill Response Operations Center is essentially a well-outfitted strategic and tactical response management center. Communications include 35 phone lines, 9 fax machines, 2 LANs, radio and internet capability, as well as video and digital imagery capability. (Clean Islands Council, 2001)

5.1.1 Ewa Beach

There are no known hazardous materials and hazardous wastes present at the Ewa Beach site. Current water quality conditions are discussed in section 3.1.3.2 of the EA.

5.1.2 Waianae Coast

There are no known hazardous materials and hazardous wastes present at the Waianae Coast site. However, there is one existing product off-loading facility in the Barbers Point area to the southeast of the Waianae Coast site. Current water quality conditions are discussed in section 3.1.3.3 of the EA.

5.2 Environmental Consequences

The potential impacts from the release of hazardous materials and hazardous waste could occur during recovery operations. The impacts would be associated with the unplanned release of fuel/oil that may remain in the vessel which could affect water quality, biological resources, and land areas used for a variety of public and private activities. This section addresses the potential for a release and the procedures and equipment in place to minimize harm to the environment.

In the event of an unanticipated release, the Navy would initially mobilize the appropriate equipment and implement the procedures to quickly contain and clean up a fuel/oil release. In addition, overflights would be continued during the diving operations to monitor for a fuel/oil release, especially if ongoing operations indicate a higher likelihood of a fuel/oil release (NAVSEA, 2001a).

Because of the potential for a fuel/oil release to affect the nearshore environment, the Navy would implement procedures prior to transit of the *Ehime Maru* to shallow-water. These measures would include waiting outside the shallow-water recovery sites until the trade winds are blowing off the coast, tides and currents are offshore, and booms and skimmer vessels are in place. To ensure favorable current conditions, real-time surface and column current monitoring would occur. Before initiation of transit, modeling would be conducted to determine optimal sea-state and wind conditions for transit. Overall, these procedures should minimize the potential for a fuel/oil release during the final transit and relocation to the shallow-water recovery sites.

The environmental impact of a fuel/oil release is generally greater in shallow, near-shore waters than at offshore, deep-water recovery site. The closer proximity to sensitive nearshore resources is a concern, but the immediate environmental impact of released fuel/oil is minimal compared with true shallow-water depths (of a few feet or less). Both mechanical recovery and dispersant operations are viable options; however, the urgency of response would be greater closer to shore. With appropriate approvals, and agreement of net environmental benefit, any fuel/oil not immediately recovered by surface fuel/oil skimmers close to the source would be immediately dispersed by dispersant systems as required. Mechanical recovery is the preferred option, but dispersants would be applied to prevent released fuel/oil from reaching and impacting sensitive shallow-water, inter-tidal, and shoreline areas. Dispersants would become the primary release response option for shallow-water operations if on-scene sea-state conditions preclude safe mechanical recovery operations (NAVSEA, 2001a) and assuming agreement as to net environmental benefit and approval by the Federal On-Scene Coordinator. Helicopters would be used to assist in determining the movement of the release on the water surface to ensure appropriate boom placement. Because of the procedures and equipment to contain and clean up an unplanned fuel/oil release, only minimal impacts to the environment would be expected.

At all of the potential recovery sites there is the potential for public and commercial use activities. These activities include netting, fishing, tropical fish collecting, surfing, scuba diving, paddling, kayaking, aquaculture, and shelling. Section 3.3 of the EA provides an overview of these resources. Every effort would be taken to contain and clean up any release such that no fuel/oil would impact the shoreline. The fuel/oil release response outlined previously would be implemented to protect these sensitive resources; therefore, it is anticipated that there would be minimal impact to the to these resources from a fuel/oil release.

6.0 Airspace

6.1 Affected Environment

Airspace Use

The overall airspace use environment in the ROI is described below in terms of its principal attributes. These attributes are controlled and uncontrolled airspace, enroute low-altitude airways, airports and airfields, and air traffic control. Other airspace use attributes, such as special use airspace, military training routes, and high-altitude jet routes, are not relevant here. This is because the jet routes, all above 18,000 feet (5,486 meters), are well above the activities proposed, and because there is no special use airspace, and no military training routes in the ROI. The airspace use over the individual sites associated with the Proposed Action is described in following sections.

Controlled/Uncontrolled Airspace

The ROI is dominated by the Class B Airspace that lies above and around Honolulu International Airport. It is composed of the "upside-down wedding cake" layers typical of the Class B Airspace that surrounds the nation's busiest airports. It consists of a "core" surface area that extends from the surface up to 9,000 feet (2,743 meters) above sea level out to a 5-nautical-mile (9-kilometer) radius. This "core" surface area is, in turn, surrounded by several layers of varying floor altitudes but the same ceiling altitude of the "core" area (figure L-7).

Figure L-7: Airspace ROI-TO BE SUPPLIED

Below the Class B layers, between the 5-nautical-mile (9-kilometer) radius "core" area and 15 nautical miles (28 kilometers) out, is Class E controlled airspace with a floor 700 feet (212 meters) above the surface. This layer of controlled airspace is itself underlain with uncontrolled (Class G) airspace from the surface to 700 feet (212 meters). Further out to 20 nautical miles (37 kilometers), the underlying airspace is also uncontrolled (Class G) airspace, with varying altitudes.

Enroute Airways

A number of low altitude enroute airways enter or transect the ROI (figure L-7). These airways are referred to as Class E airspace, established in the form of a corridor. The corridor's centerline is defined by radio navigational aids. They form a network serving aircraft up to, but not including, 18,000 feet (5,450 meters) above sea level. The sections below identify the nearest enroute airways.

Airports and Airfields

Honolulu International Airport and Hickham Air Force Base lie on the northern edge of the airspace use ROI. Honolulu International Airport is Hawaii's principal airport, with approximately 1,000 operations (departures and arrivals) per day in the year 2000 (Schlapak, 2001a). A total of 22.3 million passengers arrived in fiscal year 1999 (Hawaii Department of Transportation, 2001). Figure K-1 in appendix K shows the precision instrument approach zone slopes for both runways at Honolulu International Airport. These show the standard instrument approach procedure flight paths for arriving aircraft. Figures K-1 through K-8 in appendix K show the various instrument approach patterns for the different runways at the airport. There are no temporary flight restrictions (TFRs) currently used at the airport.

In addition to the fixed-wing operations at Honolulu International Airport, commercial tour operator helicopters account for approximately 30 operations per day. Their normal flight routes hug the coast of Oahu east of the airport toward Makapuu Point. They typically either circle the entire Koolau Range returning to the airport over Kamehameha Highway, down the central part of Oahu to Pearl Harbor and the airport, or fly over the Pali Pass. The U.S. Coast Guard and local Fire and Ambulance helicopters are also based at the airport (Schlapak, 2001a, b).

Kapolei/Kalaeloa (John Rodgers Field) Airport just east of Barbers Point on the coast west of Honolulu had approximately 440 operations (departures and arrivals) in the year 2000, primarily touch-and-go training takeoffs and landings by light-plane pilots, the National Guard, and others (Schlapak, 2001a). Figures K-8 and K-9 in appendix K show the instrument approach patterns for the airport.

Air Traffic Control

Air traffic in the ROI within the 12-nautical-mile (22.2-kilometer) territorial waters limit of the United States is managed by the Honolulu Air Traffic Control Center (ARTCC). The airspace beyond these territorial waters is in international airspace. Because it is in international airspace, the procedures of the International Civil Aviation Organization (ICAO) are followed (ICAO, 1985, 1994). The FAA acts as the United States agent for aeronautical information to the ICAO, and air traffic in the ROI is managed by the Honolulu ARTCC and the Oakland ARTCC.

6.1.1 Ewa Beach

Controlled/Uncontrolled Airspace

The Ewa Beach site lies under one of the “upside-down wedding cake” layers of Honolulu International Airport’s controlled (Class B) airspace. Beneath this layer, is another layer of controlled (Class D) airspace surrounding Kapolei/Kalaeloa (John Rodgers Field) Airport. The Class D airspace extends from the surface to 2,500 feet (762 meters) above sea level (figure L-7). Two-way radio communication must be established with the Honolulu Air Traffic Control prior to entry and thereafter while in this Class D airspace.

Enroute Airways

The V12-15 airway over the southern coast Oahu, passes just north of the Ewa Beach site (figure L-7).

Airports/Airfields

The Ewa Beach site is approximately 2 nautical miles (3.7 kilometers) from the Kapolei/Kalaeloa (John Rodgers Field) Airport. Although well removed from the airport’s regular approach and departure patterns, it does lie below the missed approach path for one of the runways (figure K-8, appendix K).

Waianae Coast

The Waianae Coast site lies under one of the “upside-down wedding cake” layers of Honolulu International Airport’s controlled (Class B) airspace. Beneath this layer is another layer of controlled (Class D) airspace surrounding Kapolei/Kalaeloa (John Rodgers Field) Airport. The Class D airspace extends from the surface to 2,500 feet (762 meters) above sea level (figure L-7). Two-way radio communication must be established with the Honolulu Air Traffic Control before and after entry while in this Class D airspace.

Enroute Airways

The V12-15 airway passes to the south of the Waianae Coast shallow-water recovery site (figure L-7).

Airports/Airfields

The Waianae Coast shallow-water recovery site is approximately 4 nautical miles (7.4 kilometers) from the Kapolei/Kalaeloa (John Rodgers Field) Airport (figure L-7). It is well removed from the airport's approach and departure patterns (figures K-8 and K-9, appendix K).

One other distinction is that the transit route from the Ewa Beach shallow-water recovery site does not pass under the inner "core" of the Class B airspace that extends to the surface (figure L-7).

Environmental Consequences

This section describes the potential impacts to airspace as a result of the relocation and recovery activities. These activities would require the implementation of a TFR area that could affect airspace.

A TFR would be imposed by the FAA in the airspace above the recovery effort operations. The TFR, allowed by Federal aviation regulations, would prevent an unsafe congestion of sightseeing aircraft above the lifting operation. It would also ensure that operations would not interfere with communications on the decks of vessels involved in the operation. A NOTAM would be issued to alert pilots of the TFRs. The NOTAM would contain specific information for pilots, including the location, effective period, and the exact area and altitudes affected. The NOTAM would also include the FAA coordination facility and commercial telephone number, the telephone number of the U.S. Navy office directing the recovery operations, and any other information considered appropriate by the Honolulu Air Traffic Control Center.

6.2.1 Ewa Beach

Controlled/Uncontrolled Airspace

The Ewa Beach site lies in the Class D airspace associated with Kapolei/Kalaeloa (John Rodgers Field) Airport. This airspace extends from the surface to 2,500 feet (757 meters) above sea level. All aircraft flying within this controlled airspace would already be required to establish two-way radio communication with air traffic control before entering and while flying in it. Establishment of a 1-nautical-mile (1.85-kilometer) radius TFR, and release of a NOTAM would provide additional control of the airspace above the operation. It would temporarily change the nature of the airspace above Ewa Beach site, but would not adversely impact navigable airspace in the ROI.

Enroute Airways

There is one enroute low altitude airway, V12, in the airspace above the Ewa Beach site. However, it passes just north of the site over the adjacent shoreline. Therefore, establishment of the TFR would not require aircraft flying in the airway to change their course or flight altitude. Consequently, there would be no impacts to the surrounding low altitude airways from operations at the Ewa Beach site and no potential indirect impacts from shift in aircraft noise contours.

Airports/Airfields

Kapolei/Kalaeloa (John Rodgers Field) Airport lies just to the west of the Ewa Beach site, but well removed from the airport's regular aircraft approach and departure patterns. The establishment of a 1 nautical mile (1.85 kilometer) radius TFR, and release of a NOTAM would control the airspace above the operation. The missed approach path for the airport's runway, used when aircraft cannot complete a landing safely (see appendix K) is closer, but still would be west of the TFR area. Therefore, the TFR associated with shallow-water recovery operations would not restrict access to, or affect the use of any airfield or airport available for public use, and would not affect airfield/airport arrival and departure traffic flows.

6.2.2 Waianae Coast

Controlled/Uncontrolled Airspace

The Waianae Coast site also lies in the Class D airspace associated with Kapolei/Kalaeloa (John Rodgers Field) airport. However, unlike the Ewa Beach site, it is some distance away, around and north of Barbers Point. This airspace extends from the surface to 2,500 feet (757 meters) above sea level. All aircraft flying within this controlled airspace would already be required to establish two-way radio communication with air traffic control before entering and while flying in it.

Establishment of a 1-nautical-mile (1.85-kilometer) radius TFR and release of a NOTAM would provide additional control of the airspace above the operation. These measures would temporarily change the nature of the airspace above the Waianae Coast shallow-water recovery site, but would not adversely impact navigable airspace in the ROI.

Enroute Airways

There are no low altitude enroute airways in the Waianae Coast site ROI. Therefore, establishment of TFR area would not require aircraft flying in the airway to change their course or flight altitude. Consequently, no impacts to the surrounding low altitude airways would result from operations at the Waianae Coast site.

Airports/Airfields

Although located in the Class D airspace associated with Kapolei/Kalaeloa (John Rodgers Field) Airport, the Waianae Coast site is well removed from the airport's regular aircraft approach and departure patterns. Therefore, the TFR associated with shallow-water recovery operations would not restrict access to, or affect the use of, any airfield or airport available for public use, and would not affect airfield or airport arrival and departure traffic flows. As a result, there would be no potential impacts from the shift in aircraft noise contours.

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